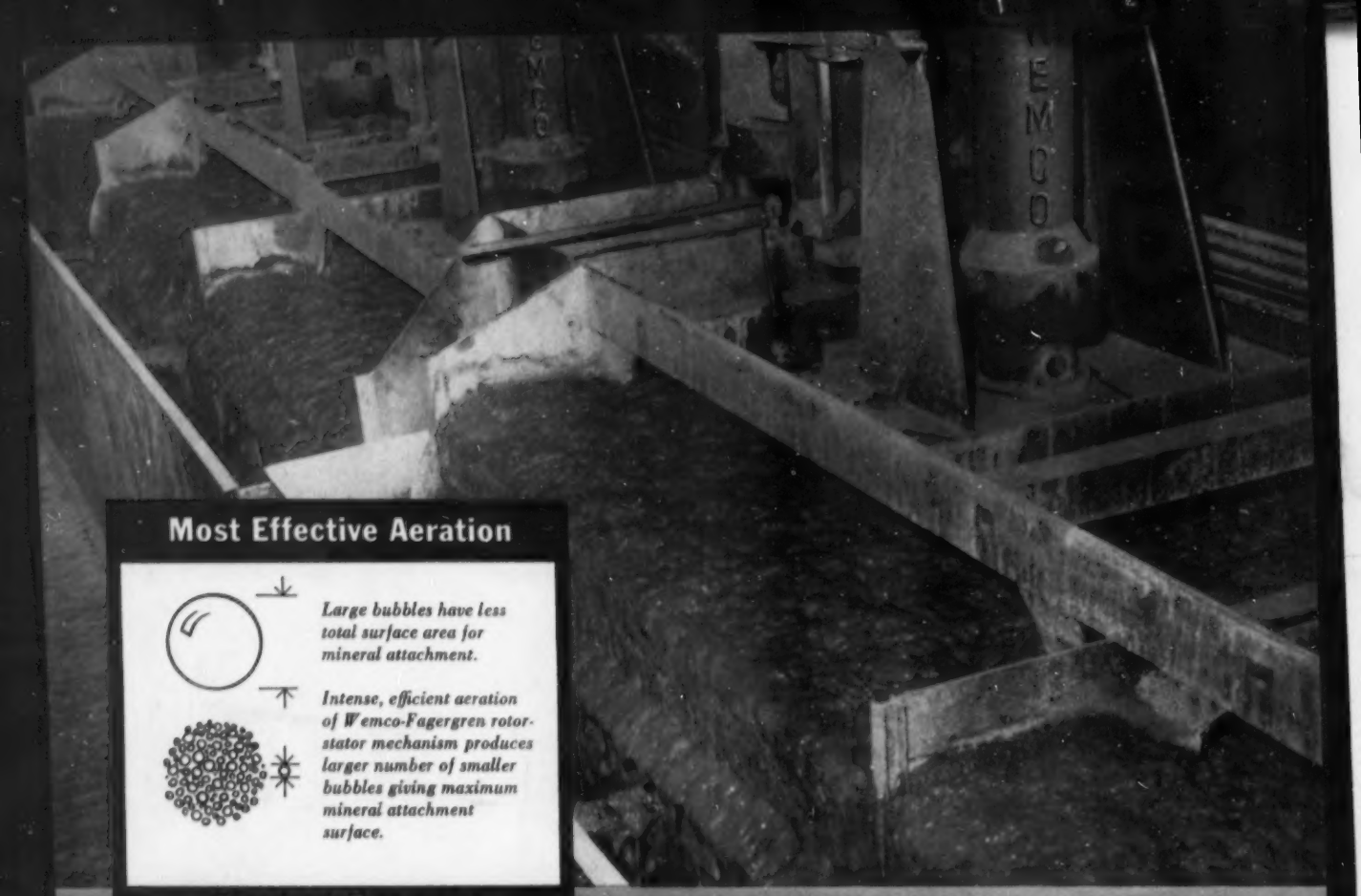
MINING WORLD

NOVEMBER 1956 Vol. 18 No. 12

The New Look at Butte—Open Pit Mining

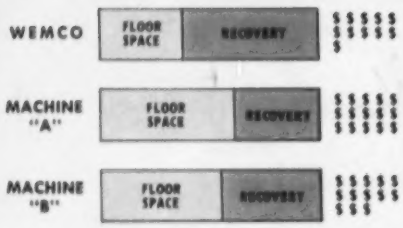


Most Effective Aeration

Large bubbles have less total surface area for mineral attachment.

Intense, efficient aeration of Wemco-Fagergren rotor-stator mechanism produces larger number of smaller bubbles giving maximum mineral attachment surface.

Greatest Recovery per Dollar



Highest Recovery of Values

1.5% more molybdenum
1.0% more copper
5.0% more silver
1-2% more gold
— with Wemco

by every competitive test... Wemco Fagergren proves best

In recent, rigorous testing with top-notch competitive equipment, Wemco Fagergren Flotation Machines proved best in recovery, grade, floor space, cost and maintenance — as the following test results indicate:

"... One goal of the test was *recovery*, without sacrifice in grade, and the *Wemco Fagergrens consistently led in this factor.*

"... as the test progressed there was a trend to increase tonnages of feed per machine. As these tonnages were increased, operating horse-power increased on all machines *except the Wemco Fagergrens.*

"... mechanical and design changes were made on several occasions in (two of the competitive) units. During the testing program *there were no mechanical revisions or design changes on the Wemco Fagergrens.*"

- And as final proof of their superiority, Wemco Fagergrens also excelled on such important counts as *simplicity of operation . . . least total number of mechanisms required . . . longer effective life of wearing parts.*

For more details of Wemco leadership, write today

WEMCO
WESTERN MACHINERY COMPANY

650-B Fifth Street · San Francisco 7, California

Representatives throughout the United States and Canada and in major countries around the world.

Large mill hammers taken from the scrap pile needed a 2" to 2¼" build-up on length . . . required approximately 5 lbs. of Manganese and Stoody 100, combined. Smaller amounts of build-up and hard metal are required for subsequent maintenance.

DON'T THROW AWAY 9/10 OF EVERY MILL HAMMER

The Victorville Lime Rock Company on the Mojave Desert some 75 miles from Los Angeles operates a plant for the reduction of high grade limestone that is processed for a great many uses, from face powder base to roofing materials. For intermediate crushing the company uses Williams hammer mills —and as usual, hammer maintenance is a problem.

When a Stoody representative first called at this plant he found a scrap pile of worn hammers that had been discarded in favor of standard replacements. 9/10 of the hammer was still there but so severely worn as to have lost its efficiency. A set of nine new hammers represents an investment of approximately $200.00, so the huge scrap pile, to the hard-facing specialist, had all the appearance of a gold mine.

Tests were undertaken to determine the cost of rebuilding such hammers; a copper form was clamped around the worn end to fix the shape and the finish length. Using the semi-automatic welder running Stoody Nickel Manganese, the hammer was brought back to just under finish size, then peened and hard-faced on the end and corners with Stoody 100.

The original experimental rebuilding job proved successful and the procedure outlined has now been established as routine. New hammers measuring 4"x5"x10½" weigh 45 pounds. Between four and five pounds of Manganese and Stoody 100, a high-alloy, wear-resistant material, are required to bring a worn hammer back to size. The semi-automatic welding procedure is extremely fast, depositing three to six times as much weld metal as is possible by the manual method. After rebuilding, each hammer is carefully weighed and balanced for proper operation of the mill. As wear occurs in service, the semi-automatic welder is used to apply additional Stoody 100 free hand to maintain hammer size and shape.

By the method described hammer costs are enormously reduced and the mill's performance is considerably improved.

Further information on the hard-facing of all types of crushing equipment is provided by various pieces of Stoody literature. See your Stoody dealer (you will find him in the "Yellow Pages" of your phone book) or write direct.

George Stone, Maintenance Superintendent, shows turn-table fixture which speeds welding. Forms surrounding hammers are copper, establish hammer size and height of build-up.

Other hard-facing includes these quarry shovel teeth. Points are rebuilt with Stoody Manganese and hard-faced with Stoody 100. Note the copper mold which shapes the point.

STOODY COMPANY

11969 East Slauson Avenue
Whittier, California

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 18 **NOVEMBER 1956** NO. 12

OPERATIONS—TECHNOLOGY

IN THE NEWS

DEPARTMENTS

ON THE COVER: Anaconda's new look at Butte, Montana. The new Berkeley open pit in the shadow of the Rarus headframe typical of Butte's traditional look—underground mining. This 6-yard electric shovel loads over 8,000 tons of waste overburden per shift.

PUBLISHING OFFICE: Emmett St., Bristol, Conn.

EDITORIAL AND EXECUTIVE OFFICES

121 Second St., San Francisco 5, Calif., GArfield 1-5887

General Manager ..... M. F. Holsinger
Editor ..... George O. Argall, Jr.
Associate Editor ..... Stanley Dayton
Mgr., Eng. Services .. H. G. Grundstedt
News Editor ..... Janet M. Taylor
Assistant News Editor L. A. Charbonneau
Product Editor ..... B. A. McCurry
Production Manager ... J. A. Cheesman
Dist. Mrg., New York .... A. E. Roberts
Dist. Mgr., Chicago ..... R. N. Crosby
Assoc. Ed., Vancouver . Charles L. Shaw

BRANCH OFFICES: New York 17-370 Lexington Ave., Murray Hill 3-9295, Chicago 26—1791 Howard, Rogers Park 4-3420. Vancouver, B.C.—402 Pender St. West, MAzine 7287.

PUBLISHED BY American Trade Journals, Inc.
Wm. B. Freeman, President — L. K. Smith, Vice President
Miller Freeman, Jr., Sec.-Treas.

STAFF CORRESPONDENTS: **Africa**—Johannesburg, Union of South Africa; Salisbury, Southern Rhodesia. **Asia**—Ankara, Turkey; Kuala Lumpur, Federated Malay States; Tavoy, Burma; Karachi, Pakistan; Seoul, Republic of Korea; Tokyo, Japan. **Europe**—London, England; Vienna, Austria; Stockholm, Sweden; Trondheim, Norway; Paris, France; Redruth, Cornwall. **North and Central America**—Mexico D. F., Mexico; Vancouver, British Columbia. **South America**—Sao Paulo, Brazil; La Paz, Bolivia; Lima, Peru; Bernal, Argentina. **Oceania**—Port Kembla, N. S. W., Australia; Manila, Philippine Islands. Not responsible for unsolicited manuscripts.

Mining World Subscription Rates

U. S. North, South and Central America	$3.00
Other Countries	$4.00
Single Copies	$ .50
Directory Number	$1.00

WORLD MINING is published the 28th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

MILLER FREEMAN PUBLICATIONS

MINING WORLD, November, 1956. Volume 18, No. 12. Published monthly, except April, when publication is semi-monthly at Emmett St., Bristol, Conn., Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central, and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 121 Second St., San Francisco 5, Calif.

Capitol Concentrates

Additional Funds Are Authorized For Government DMEA Program

An additional $6,000,000 in borrowing authority for the fiscal year 1957 has been authorized for the Defense Minerals Exploration Administration. This amount brings to $34,000,000 the total funds authorized by the Office of Defense Mobilization for the DMEA program.

DMEA was established in November 1951 to encourage exploration for indicated or undeveloped sources of critical and strategic minerals by furnishing financial aid on a participating basis in the cost of an approved exploration project. Under present policies, the government will share in the allowable cost of exploration for an approved project at the rates of 50 or 75 percent, depending on the mineral involved.

From the start of the program through July 1956, DMEA had received 3,215 applications for exploration assistance and had approved and executed contracts for 925 projects. The total value of all projects covered by contracts executed during that period was $43,170,927, with government participation limited to $26,506,150. Of the latter amount, only $16,127,921 had actually been disbursed at the end of July.

• Market Reflects Vulnerability Of Sea Lanes

The market reaction on the prices of such minerals as manganese and tin which depend upon the Suez Canal for transportation, strengthens the hand of those who believe that great stress on domestic production is necessary. The Suez difficulty is a minor matter compared to what could happen now that long-range Russian bombers can cover the world without refueling. Knocking out 10 or 12 ports and two canals with small nuclear weapons would bring all water traffic in strategic minerals to an immediate standstill. It is inconceivable that the Russians do not have crews already briefed for this purpose in case a war breaks out during which the large atomic bombs are barred by mutual agreement.

• Government Barters For Strategic Materials

In the fiscal year which ended June 30, 1956, government-owned farm commodities valued at $104,900,000 were bartered for a like value of "supplemental-type" strategic minerals by the U. S. Department of Agriculture. The minerals, which ultimately will be transferred to the federal stockpile, and their monetary value were as follows: bismuth, $900,000; cadmium, $5,100,000; industrial diamonds, $26,200,000; ferrochrome-silicon, $10,000,000; ferromanganese, $46,100,000; fluorspar, $11,800,000; manganese ore, $200,000; mica, $700,000; palladium, $1,700,000; and rare earths, $2,200,000.

For July, the barter agreements had a value of $15,300,000. When these contracts are carried out, the Department of Agriculture will receive $9,900,000 worth of beryllium-copper master alloy; $3,400,000 worth of manganese ore; $1,200,000 of mica; and $800,000 of cadmium. Still to be completed are negotiations for the exchange of $15,000,000 worth of wool for Turkish metallurgical-grade chrome ore meeting national stockpile specifications. The wool was acquired by the Commodity Credit Corporation under its price support program.

It may be noted that in reporting barter acquisitions, the agency made no mention of lead and zinc. Presumably, lead and zinc come under the "long-term" stockpile classification, and no information is divulged as to totals in that case.

• Tax Incentive Ended For Rutile

The Office of Defense Mobilization has ended its program of awarding tax help as an incentive to boost the production of rutile, a basic mineral used for making titanium metal.

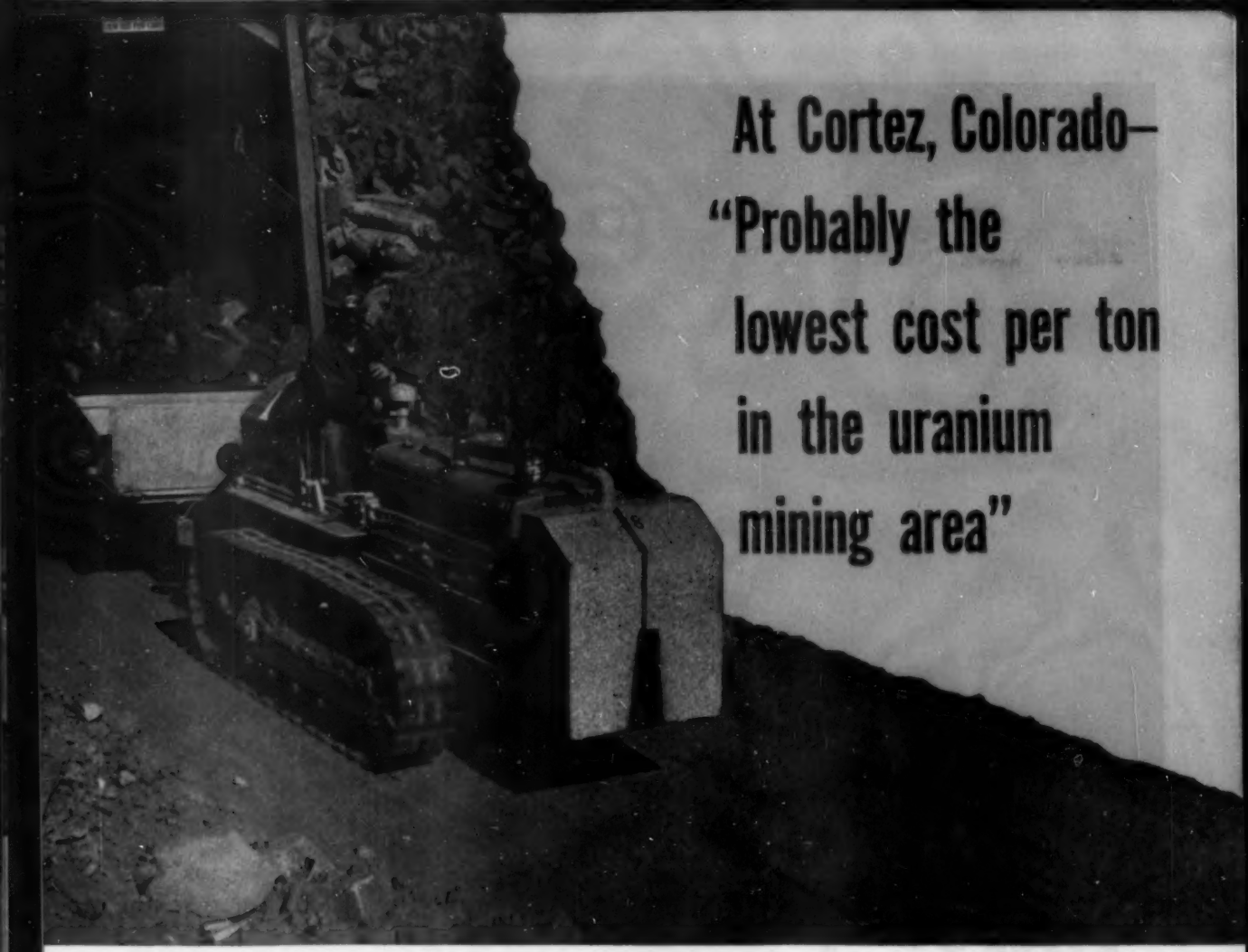
The tax incentive program was directed toward increasing production of the mineral in the United States to 35,000 tons a year. Although this goal has not been reached, ODM said the defense demand for titanium bearing ores can be met with existing rutile facilities and ilmenite and titanium slag. The present rate of rutile production was not revealed.

The tax assistance has been in the form of rapid amortization permits which allow a company to depreciate expanded defense-needed facilities faster than is normally allowed—frequently 5 years instead of 15 or 20 years. This procedure has the effect of reducing tax payments in the early years, but increases them later on when the facilities have been depreciated for tax purposes.

• Columbium and Titanium Studies Scheduled

A new appraisal of columbium-tantalum requirements is to be made this fall. The Office of Defense Mobilization has asked the Department of Defense for the special study because of a heavy increase in current demand. The study is expected to determine whether or not the expansion goal for columbium-tantalum, now closed, should be opened to encourage an increase in production.

ODM also asked that a new evaluation be made of the titanium program, following submission by the Defense Department of revised mobilization requirements. Domestic production, ODM said, has been maintained well ahead of consumption, with most of the surplus going to the government. Total domestic production for the year ending June 30, 1956, was 8,803 tons. Imports for consumption were 901 tons and consumption totaled 6,656 tons.



At Cortez, Colorado— "Probably the lowest cost per ton in the uranium mining area"

Archie Garwood is a partner in G. & G. Mining Co., of Cortez, Colo. Here is what he says about the firm's eight Caterpillar track-type Tractors: "We chose Cat-built machines because we knew we'd be getting the best. Our operating costs are very low--probably the lowest per ton in the entire uranium mining area. Although we're operating in one of the most inaccessible localities in the U.S., we've had excellent service from our Caterpillar Dealer."

Two CAT* D2 Tractors with tram wagons average about 360 tons per day hauled out of the mine. Another D2 is available for the same work if needed, and a drill jumbo is mounted on a fourth. Notice the exhaust scrubber mounted on the front of the D2 Tractor shown above. Thanks to clean combustion afforded by their Caterpillar-built fuel injection systems, Cat diesel-powered machines with scrubbers are entirely practical for underground use.

Three Caterpillar-built Traxcavators* load the ore underground, and above ground where trucks haul it to Moab, Utah, 45 miles away. A Caterpillar D6 Tractor is used for 'dozing haul roads, stockpiling, and general clean-up work around the mine.

The compact and maneuverable D2 Tractor is ideal for underground use, and wherever working space is cramped. Now available with optional oil clutch for longer facing life and fewer clutch adjustments, the new Caterpillar D2 Tractor is built to outwork and outlast any other machine in its class. With a wide choice of attachments to choose from, the versatile D2 can be "tailor made" for use in *your* mine.

Your Caterpillar Dealer has full details on this tough and willing worker. Ask him for an on-the-job demonstration—and count on him for prompt service and parts you can trust.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks

NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE

Lower your ore reduction costs WITH THE HIGHER EFFICIENCY OF

Traylor TY REDUCTION CRUSHERS

When you're faced with the problems of boosting daily tonnage figures and lowering production costs at the same time, you'll find the solution in a Traylor TY . . . the same as more than 806 operators on all types of secondary crushing installations throughout the world.

This proven production ability of the TY is due mainly to the unique design of its self-tightening bell head and Traylor curved concaves. Both these outstanding design features were developed as the result of more than a half century of Traylor engineering experience in this highly specialized field.

Traylor original curved crushing surfaces apply power as a direct crushing force. Traylor curved concaves working in combination with the Traylor bell head reduce lifting and churning of material in the crushing chamber.

Get all the facts on Traylor TY Gyratory Crushers . . . send for your copy of Traylor Bulletin #8112 describing all the features of the TY which can lead you to more profitable ore reduction.

TRAYLOR ENGINEERING & MANUFACTURING CO.
818 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
CANADIAN MFR: Canadian Vickers, Ltd., Montreal, P. Q.


PRIMARY GYRATORY CRUSHERS · ROTARY KILNS · SECONDARY GYRATORY CRUSHERS · BALL MILLS · JAW CRUSHERS · APRON FEEDERS

INDUSTRIAL SCREENS

for accurate, low-cost screening

You can get a CF&I Industrial Screen that has exactly the right combination of features to assure fast, accurate, low-cost service in your screening operation. That's because CF&I Screens are available in standard and special weaves . . . and can be supplied in a wide variety of carbon and alloy steels, as well as in non-ferrous metals.

It's extremely simple to get the complete story on how CF&I Industrial Screens can be used to improve your screening operation—just contact your nearby CF&I representative. No obligation on your part, of course.

SPACE SCREENS

THE COLORADO FUEL AND IRON CORPORATION

3676

THE COLORADO FUEL AND IRON CORPORATION: Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston
Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Wichita
WICKWIRE SPENCER STEEL DIVISION: Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Toronto • Montreal CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

Built Big for Big Hauls

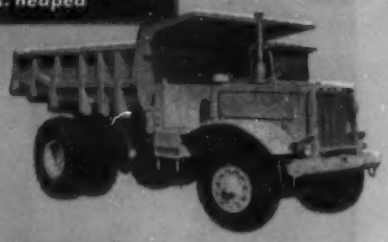
EXTRA RUGGED FOR ALL EARTH AND ORE MOVING JOBS

These rugged movers are built big *all over!* Ton for ton, Kenworth end-dump trucks have greater strength for longer life and less maintenance. Engineered for more driver comfort, safety and control, these production builders are spring mounted—supply unsurpassed visibility and dime-sized turning radius. Extra rugged, their variable section frames are designed to provide deepest sections at points of greatest loading stress. Front axles are just plain big—you can't bend them! Kenworth designed, full floating rear axles are over-sized too.

Built to last—their reinforced, all-welded, box-section-ribbed steel dump bodies hold up in service. Twin, fast-acting telescopic hoists, in combination with load equalizers, provide positive stability. Stem to stern, Kenworth builds 'em big—to deliver maximum performance on the toughest jobs!

KENWORTH 801
12 cu. yds. struck—
14 cu. yds. heaped
18-TON

KENWORTH 802
16 cu. yds. struck—
19 cu. yds. heaped
24-TON



KENWORTH 802B
32 cu. yds. struck-
48-TON

KENWORTH 803
24 cu. yds. struck—
28 cu. yds. heaped
36-TON

KENWORTH

TRUCKS ★ BUSES

FACTORY AND HOME OFFICE: SEATTLE, U. S. A., DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

DORRCO *JET* SIZER

at Climax Uranium...

Closeup of Dorrco Jet Sizer at Climax Uranium taken from overflow end of machine

The 65' dia. Dorr Thickener with rake and electric overflow lift shown

Earliest producer on the Colorado Plateau, Climax Uranium uses Dorr-Oliver equipment for key classification, thickening and filtration steps throughout the flowsheet. The initial sand-slime separation is made in a 7½ pocket Dorrco Jet Sizer. Feed to the unit is 400 TPD of all 28 mesh material which is split at 150 mesh. A hindered settling classifier, the Dorrco Jet Sizer utilizes an overhead, removable hydraulic water distribution system which eliminates costly constriction plate construction. Adjustments to changes in feed composition are automatic to insure constant pulp density and product quality.

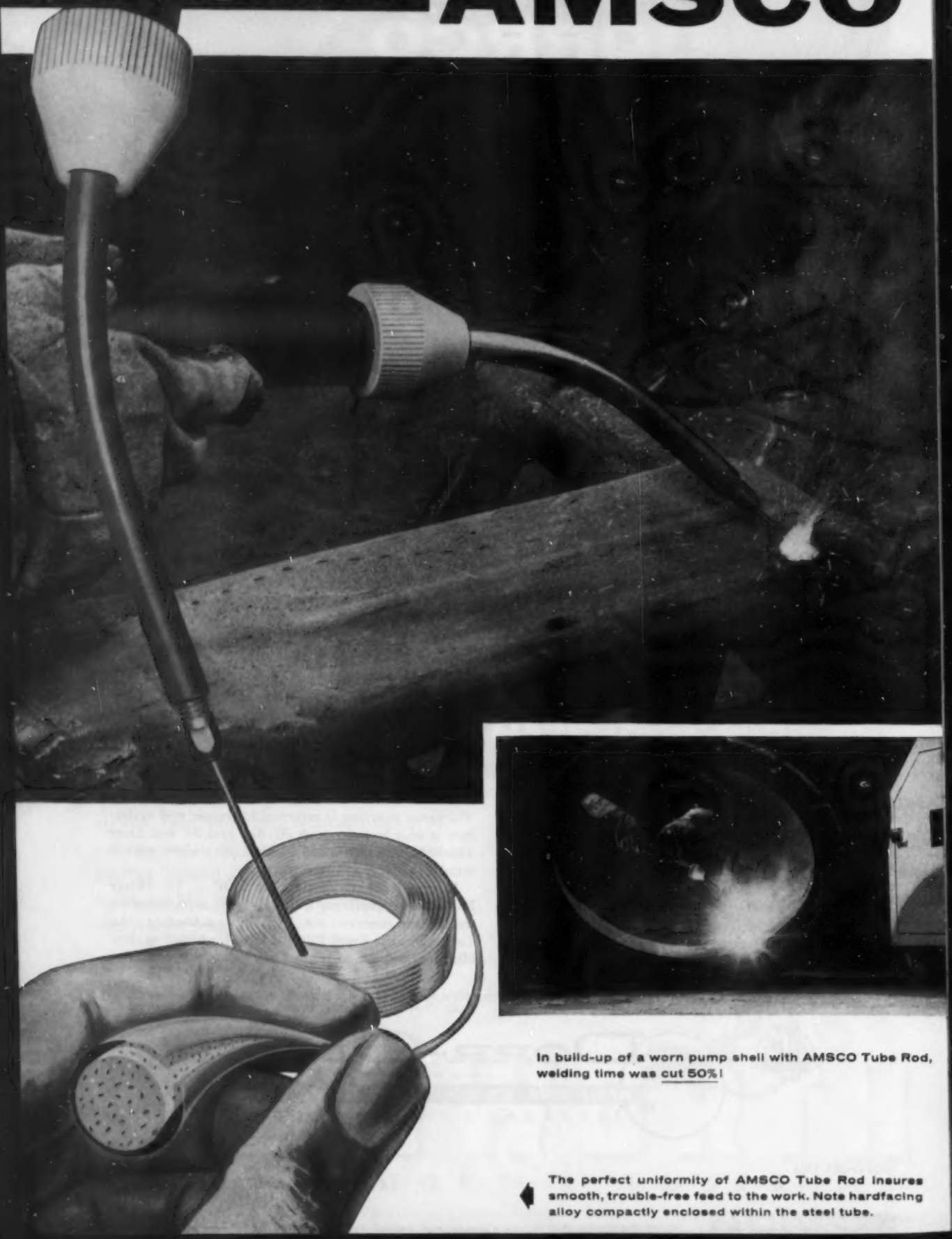
Sizer spigot product goes to leach tanks and sizer overflow (−150 mesh) to a 65′ dia. Dorr Thickener. Thickener overflow is returned for re-use and underflow is sent to process. A 50′ dia. and 24′ dia. Dorr Thickener are also installed at Climax along with a number of Dorrco VM Pumps.

In the leaching section an 11′6″ x 12′ Oliver Panel Filter performs a liquid-solids separation on the leached uranium ore. Employing a floating cake discharger, the Panel Filter is ideal for handling slow filtering products forming slimy cakes.

For more information on the complete line of D-O equipment for the mining industry, write for a copy of bulletin No. 2200. Dorr-Oliver Incorporated, Stamford, Connecticut

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Announcing the NEW AMSCO®



In build-up of a worn pump shell with AMSCO Tube Rod, welding time was cut 50%!

The perfect uniformity of AMSCO Tube Rod insures smooth, trouble-free feed to the work. Note hardfacing alloy compactly enclosed within the steel tube.

TUBE RODS

. . . specially designed for FASTER, EASIER semi-automatic HARDFACING

Here's a new, improved Tube Rod . . . *specially designed and engineered* for semi-automatic hardfacing! It has *proved* its speed, quality of weld and uniform deposit in actual use-tests. In many cases, deposition rate has been increased up to 200% over other types of semi-automatic rod.

Amsco Tube Rod is easy to use . . . an inexperienced man can handle it with practically no training! It cuts down operator-fatigue, thus increasing productivity and reducing welding costs.

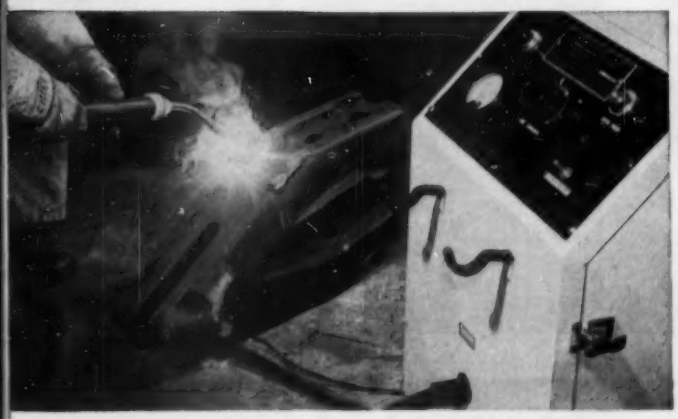
Amsco Tube Rod is a perfectly symmetrical, steel-wire shell, with the various alloys firmly enclosed within the wire, for proper weld-deposit. The steel shell is work-hardened to provide a rod that will not deform or snarl during welding . . . that is simple to drive with conventional feed rollers. Also, the rod is *automatically lubricated,* to insure constant and uninterrupted feeding to the work.

Three types of Amsco Tube Rod are available for semi-automatic welding, in 3/32" diameters only:

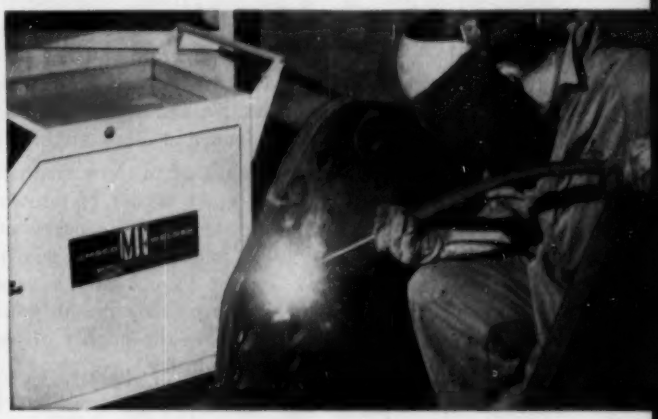
- *S/A Manganese Steel*—for all types of manganese steel build-up and repair applications.
- *S/A-53*—a high chromium alloy for general-purpose hardfacing.
- *S/A-33*—for wear resistance in severely abrasive applications.

Amsco Tube Rod is ideally suited for use with the AMSCO MF Semi-Automatic Welder . . . the most versatile and flexible welding machine for all types of shop and field applications. Or, by applying an inexpensive adapter, Amsco Tube Rod can be used with any semi-automatic machine.

For additional information and technical data on Amsco Tube Rod, see your Amsco Welding Distributor. Or write to Amsco Welding Department SA, Chicago Heights, Ill.



Build-up of a dipper base is much easier and faster with AMSCO's method of tube-rod welding.



Hardfacing the side of a backhoe bucket with AMSCO Tube Rod. Note ease of use for vertical welding in tight quarters.

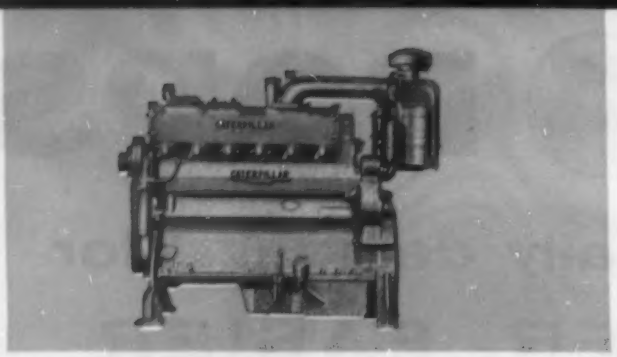
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBEC



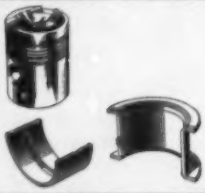
A QUARTER CENTURY OF

A CATERPILLAR FIRST
—the "Hi-Electro" hardened cylinder liner

A CATERPILLAR FIRST
—the chemically conditioned cylinder liner

A CATERPILLAR FIRST
—the stainless-steel piston protector

A CATERPILLAR FIRST
—the steel-backed aluminum bearing



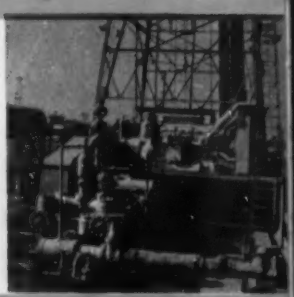
A quarter of a century ago, Caterpillar created mobile diesel power. For the first time, the power of the diesel engine was unleashed from its bulky foundations and put to work in the field—compact, economical. Here was diesel power of simple design, with no need for experts to operate and maintain. Here was diesel power with the lugging ability to knuckle down to the tough jobs.

The introduction of mobile diesel power was a tremendous advance in many fields. It provided efficient diesel power for tractors, motor graders, earthmoving equipment . . . for the work boat, the gin, the locomotive, the oil rig, the municipal plant . . . for *any* application in which steady, low-cost power is crucial. And everywhere, CAT* Diesel Engines proved themselves durable and dependable. They established Caterpillar as the leader in diesel engineering.

Today, hundreds of thousands of modern heavy-duty Cat Diesels are on the job in every corner of the world. And still the research continues. Study and experiment go ahead constantly in Caterpillar laboratories. Special testing machines help point the way toward new advances. Manufacturing techniques improve, too, in the world's largest diesel engine factory—where the quality of workmanship is the standard for the industry.

A modern world must have modern power—more and more of it. It is coming, in ever increasing quantity, from the production lines of Caterpillar, the leader.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.



CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

DIESEL POWER FOR PROGRESS

DIESEL LEADERSHIP

A CATERPILLAR FIRST
—interchangeable, adjustment-free fuel injection equipment

A CATERPILLAR FIRST
—the capsule-type injection valve

A CATERPILLAR FIRST
—the service meter

A CATERPILLAR FIRST
—superior lubricants (detergent oils)

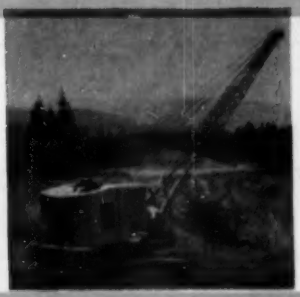













98% pure silicon is produced in Dow Corning's new 6000 kva. furnace

SILICON, second most plentiful element on earth, is so tightly combined with oxygen that it can be isolated only through complex chemistry and the terrific heat of the electric furnace. Dow Corning are performing this operation with the Lectromelt* furnace equipment shown here, producing 98% pure silicon metal.

In the furnace reaction, quartzite rock is reduced with coke and charcoal at a temperature of 3100°F. Each tapping of the furnace yields about a ton and a half of silicon. Upon cooling, it is ground to a powder and employed in the manufacture of silicones.

Lectromelt engineers, throughout the past 38 years, have been conducting continuing research on high temperature chemistry. They have designed and built many furnaces for various branches of the metallurgical and chemical industries. For their help, write Electrothermic Division, Lectromelt Furnace Company, 324 32nd St., Pittsburgh 30, Penna. (a McGraw Electric Company Division).

● **TOP:** *This Lectromelt Furnace is unique in design. Its suspended roof protects the flexible conductors and water hoses against the intense heat, but leaves the furnace open for manipulation of the charge.*

● **MIDDLE:** *3100° F., silicon's reduction temperature, is maintained at each submerged arc, the electrode moving down automatically as it is consumed. At the right is one of six chutes for charging the furnace.*

● **BOTTOM:** *Smelters, working through six open ports at the charging level, regulate, stoke and trim the flaming mixture of quartzite and coke. The crucible is 13 feet across and almost 7 feet deep.*

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagova

*REG. T. M. U. S. PAT. OFF

WHEN YOU MELT... *Lectromelt*

Serving Both Hemispheres

of the Mining World

CYANAMID

REAGENT NEWS

"ore-dressing ideas you can use"

Slime Filtration Improved With AEROMINE® 2026 Promoter

AEROMINE 2026 Promoter is being used to solve a troublesome filtration problem resulting from clay-type minerals dispersed in water. Ranging in size from 5 microns down, these particles are very difficult to filter.

Addition of 0.3 to 0.5 lbs. of AEROMINE 2026 Promoter per ton of dry solids has increased filter capacity 20 to 35%. AEROMINE 2026 Promoter is best added as a 5% water solution to a mixing tank ahead of the filters. Only gentle mixing is necessary, since violent agitation (such as developed in centrifugal pumps) breaks up the flocs and decreases effectiveness of the AEROMINE 2026 Promoter.

At this particular operation, a variety of methods was used in an attempt to solve the problem before standardizing on AEROMINE 2026 addition. Adjustment of pH by addition of lime, or the use of alum or other standard chemicals had little effect. Nor did the powerful synthetic polymers, the AEROFLOC® Reagents, give any considerable increase in filtration capacity. AEROMINE 2026 Promoter, a cationic flotation collector, did the job. AEROSOL® C-61 Surface Active Agent, a cationic, improved the filtration rate, but AEROMINE 2026 Promoter was more economic.

Perhaps AEROMINE 2026 Promoter, AEROSOL C-61 Surface Active Agent, or the AEROFLOC Reagents can be used to solve your slime filtration or settling problems. A post card or letter to our nearest office will bring you samples for testing.

AMERICAN CYANAMID COMPANY

MINERAL DRESSING DEPARTMENT

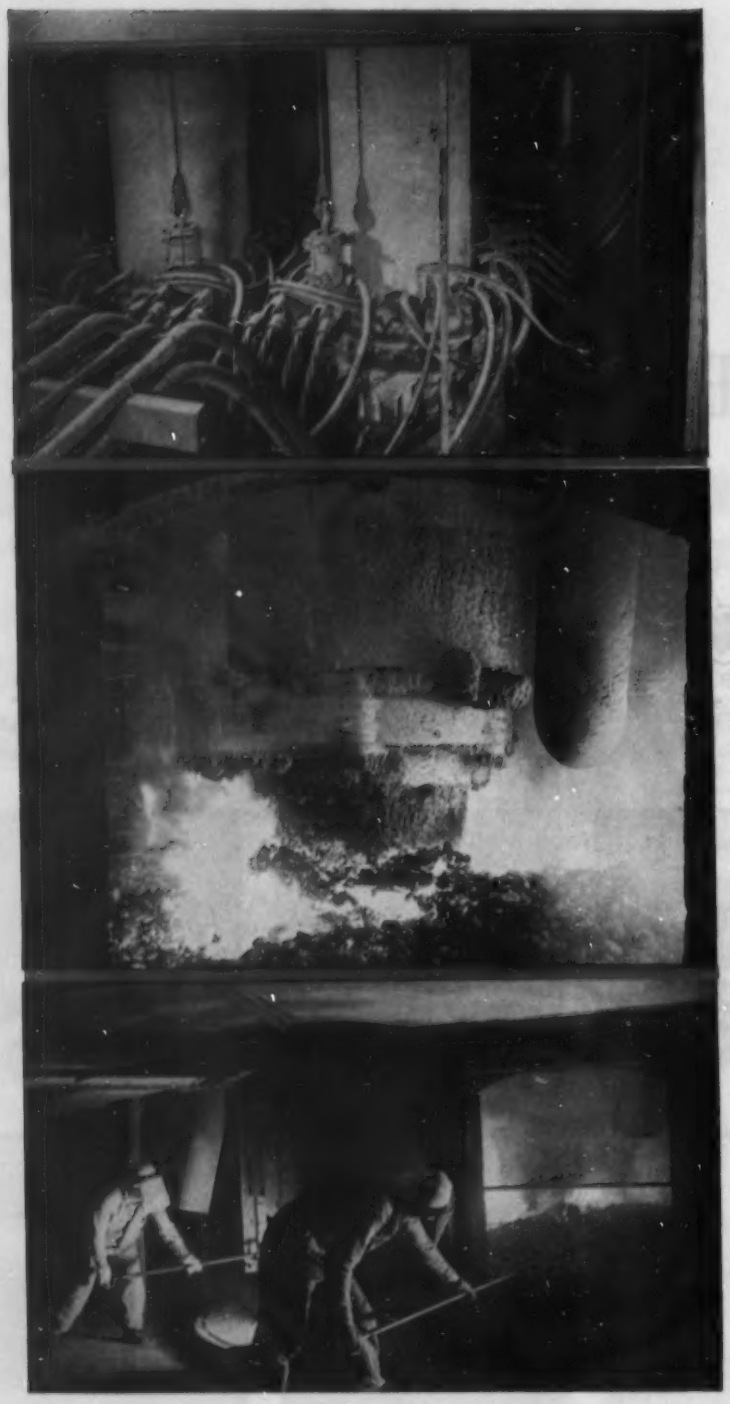
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Cable Address – Limenitro, New York

NORTH AMERICAN CYANAMID LIMITED
160 Bloor Street East, Toronto 1, Ontario, Canada
CYNAMID DE MEXICO, S. A.
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

E. P. CADWELL, Belen 1043,
Of. 6, Lima, Peru
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia



98% pure silicon is produced in Dow Corning's new 6000 kva. furnace

SILICON, second most plentiful element on earth, is so tightly combined with oxygen that it can be isolated only through complex chemistry and the terrific heat of the electric furnace. Dow Corning are performing this operation with the Lectromelt* furnace equipment shown here, producing 98% pure silicon metal.

In the furnace reaction, quartzite rock is reduced with coke and charcoal at a temperature of 3100°F. Each tapping of the furnace yields about a ton and a half of silicon. Upon cooling, it is ground to a powder and employed in the manufacture of silicones.

Lectromelt engineers, throughout the past 38 years, have been conducting continuing research on high temperature chemistry. They have designed and built many furnaces for various branches of the metallurgical and chemical industries. For their help, write Electrothermic Division, Lectromelt Furnace Company, 324 32nd St., Pittsburgh 30, Penna. (a McGraw Electric Company Division).

● **TOP:** *This Lectromelt Furnace is unique in design. Its suspended roof protects the flexible conductors and water hoses against the intense heat, but leaves the furnace open for manipulation of the charge.*

● **MIDDLE:** *3100° F., silicon's reduction temperature, is maintained at each submerged arc, the electrode moving down automatically as it is consumed. At the right is one of six chutes for charging the furnace.*

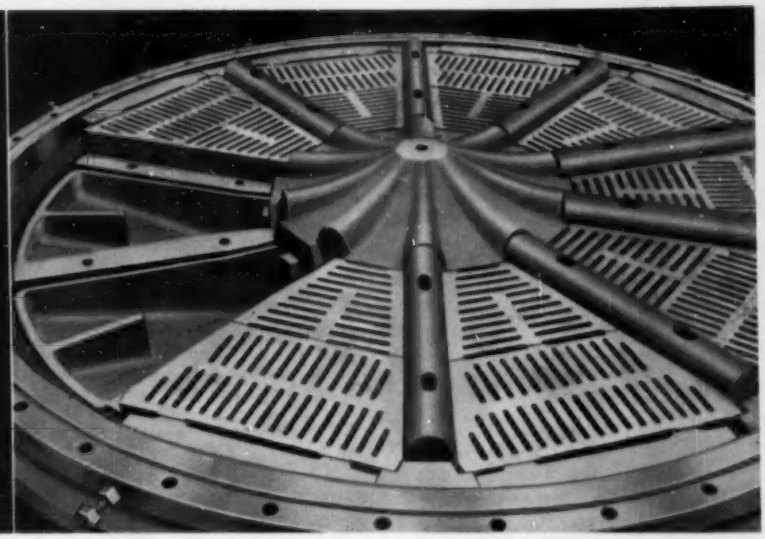
● **BOTTOM:** *Smelters, working through six open ports at the charging level, regulate, stoke and trim the flaming mixture of quartzite and coke. The crucible is 13 feet across and almost 7 feet deep.*

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa . . . JAPAN: Daido Steel Co., Ltd., Nagova

*REG. T. M. U. S. PAT. OFF

WHEN YOU MELT... *Lectromelt*

how MARCY *Experience* gives you better-built grate discharge mills



After years of research in the field of grinding Mine & Smelter made the first ball mill in 1915, incorporating the Marcy full-grate discharge. Refinements in design and construction, which can come only from *experience*, have continually improved both the mechanical and metallurgical performance of the Marcy Grate Discharge Mills. This *experience* by M&S has resulted in production of Marcy Grate Discharge Mills which, by actual operating data, have proved their ability to have up to 50% greater capacity than other type mills.

This *experience* has resulted in the incorporation of several important, exclusive features not found in other grate discharge mills...

- **Discharge head has deep chamber**...results in unrestricted discharge of material.
- **Clamp bar arrangement provides a well seated contact between grate and bars,** holds grates tightly in place, eliminates the wear, leakage, and rattling common to bolt type construction.
- **Design of slots in grate minimizes plugging.**
- **Head and grate are heavier construction,** assuring long, trouble-free life.
- **Big bearings give low bearing pressure,** reduce costly shutdowns and maintenance.
- **Meehanite Metal is used for mill heads**... its uniform density, high tensile strength, fatigue strength, rigidity and impact strength provide qualities of toughness and resilience.
- **All grate discharge parts will pass through the manhole** and are easily installed.

The Mine & Smelter Supply Co.

DENVER • SALT LAKE CITY • EL PASO • NEW YORK

Representatives in Foreign Countries

WRITE FOR CATALOG

SPECIALISTS IN GRINDING FOR 40 YEARS

CYANAMID

REAGENT NEWS

"ore-dressing ideas you can use"

Slime Filtration Improved With AEROMINE® 2026 Promoter

AEROMINE 2026 Promoter is being used to solve a troublesome filtration problem resulting from clay-type minerals dispersed in water. Ranging in size from 5 microns down, these particles are very difficult to filter.

Addition of 0.3 to 0.5 lbs. of AEROMINE 2026 Promoter per ton of dry solids has increased filter capacity 20 to 35%. AEROMINE 2026 Promoter is best added as a 5% water solution to a mixing tank ahead of the filters. Only gentle mixing is necessary, since violent agitation (such as developed in centrifugal pumps) breaks up the flocs and decreases effectiveness of the AEROMINE 2026 Promoter.

At this particular operation, a variety of methods was used in an attempt to solve the problem before standardizing on AEROMINE 2026 addition. Adjustment of pH by addition of lime, or the use of alum or other standard chemicals had little effect. Nor did the powerful synthetic polymers, the AEROFLOC® Reagents, give any considerable increase in filtration capacity. AEROMINE 2026 Promoter, a cationic flotation collector, did the job. AEROSOL® C-61 Surface Active Agent, a cationic, improved the filtration rate, but AEROMINE 2026 Promoter was more economic.

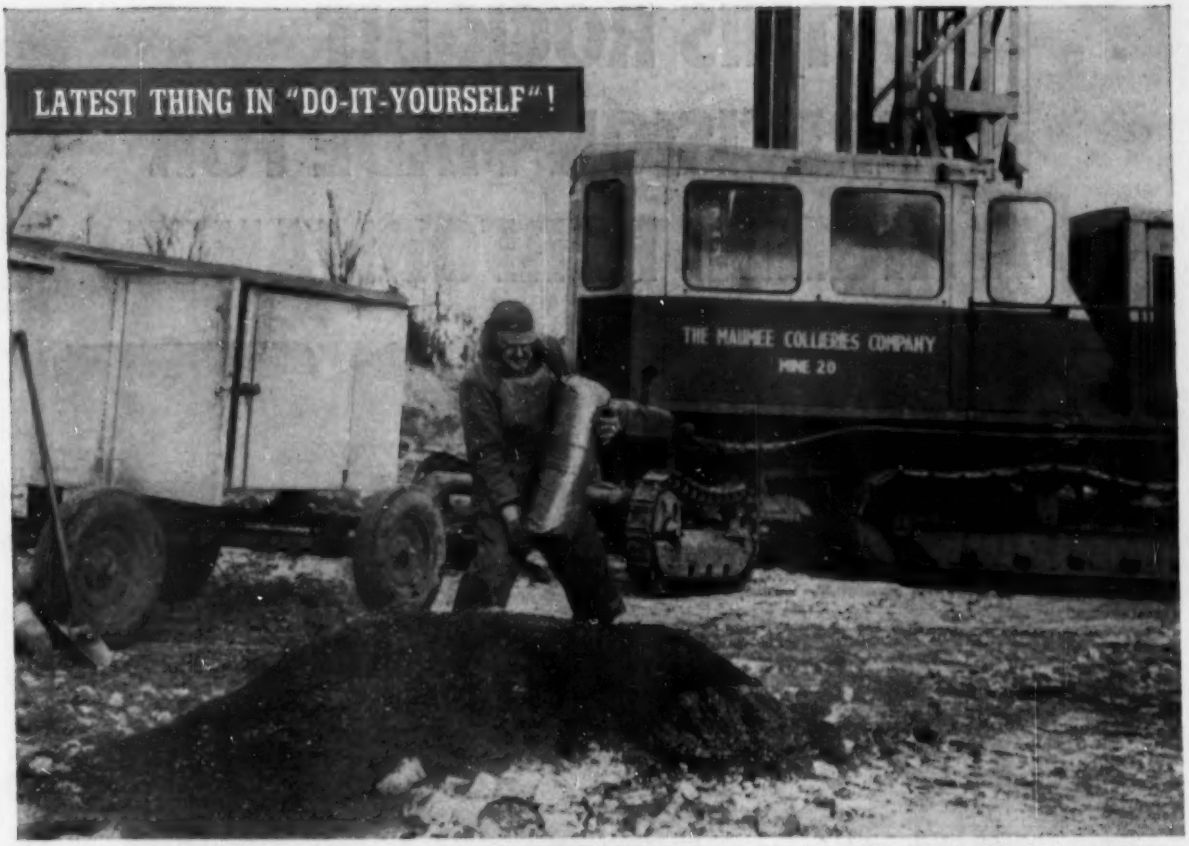
Perhaps AEROMINE 2026 Promoter, AEROSOL C-61 Surface Active Agent, or the AEROFLOC Reagents can be used to solve your slime filtration or settling problems. A post card or letter to our nearest office will bring you samples for testing.

AMERICAN CYANAMID COMPANY
MINERAL DRESSING DEPARTMENT
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Cable Address – Limonitro, New York

NORTH AMERICAN CYANAMID LIMITED
160 Bloor Street East; Toronto 1, Ontario, Canada
CYNAMID DE MEXICO, S. A.
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID PRODUCTS, LTD., Bush House,
Aldwych, London W. C. 2, England
SOUTH AFRICAN CYANAMID (PTY.) LTD.,
P. O. Box 7552, Johannesburg, Union of South Africa

E. P. CADWELL, Belen 1043,
Of. 6, Lima, Peru
G. B. O'MALLEY, MALCOLM GLEN,
377 Little Collins St., Melbourne C. 1, Australia



Developed by Maumee Collieries Co., Terre Haute, Ind.—Akremite offers high energy at extremely low cost—a combination that's hard to beat!

The Akremite* Blasting Method!

(for large-diameter blast holes)

Large operators should consider this "do-it-yourself" plan. It's a sublicensing arrangement for producing and using Akremite blasting agent.

Maximum safety, fast handling, rock-bottom cost

Here's why you'll profit: designed for dry, large-diameter holes in medium-hard material—strip-pit, open-pit or quarry shooting—Akremite's combination of safety, work and cost advantages offers a lot for a little. It cannot be detonated by caps, friction, shock or Primacord—but relatively insensitive Nitramite® primers or properly sized dynamite primers do the job. Loading's fast because Akremite plastic bags are easy to handle and expand to fill the hole. Non-headache-producing—high energy—*amazingly* low cost.

Write for complete details

So if you're looking to increase safety and save money—investigate the use of Akremite NOW. You can make it yourself by a simple process, as many large coal strippers are doing. Or, if you prefer, you can buy Akremite direct from Du Pont. Write us for complete details, or contact any of the companies listed at lower left. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

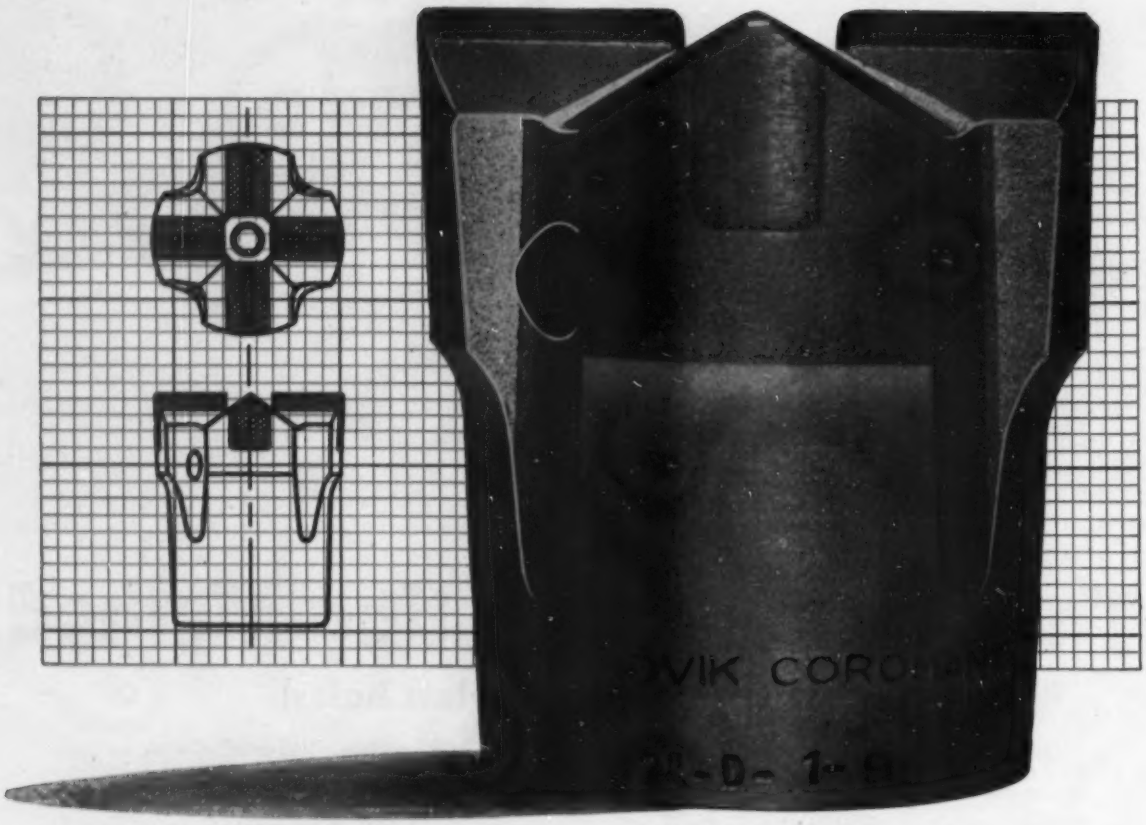
---

*Licensed exclusively to the Du Pont Company under the Maumee Collieries Co. Process Patent No. 2,703,528 and presently sublicensed to . . .

AMERICAN CYANAMID COMPANY
ATLAS POWDER COMPANY
AUSTIN POWDER COMPANY
ILLINOIS POWDER MANUFACTURING COMPANY
INDEPENDENT EXPLOSIVES COMPANY
INDEPENDENT EXPLOSIVES COMPANY OF PENN.
KING POWDER COMPANY
OLIN-MATHIESON CHEMICAL CORPORATION
PACIFIC POWDER COMPANY
TROJAN POWDER COMPANY

AKREMITE BLASTING METHOD
LICENSED TO
DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

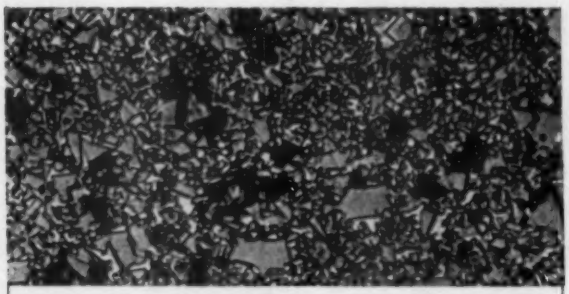
THIS ROCK BIT IS PRECISION-MADE FOR A HIGHER PERFORMANCE



Nothing tougher and more wear-resistant than the insert of a Sandvik Coromant 776 bit

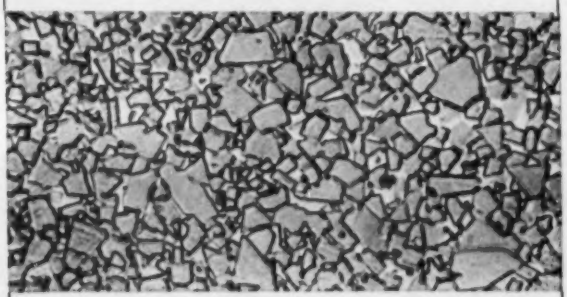
Rock bits that go on *and on* must have highest-grade tungsten-carbide inserts. Nothing but tungsten carbide in its purest state is good enough, will last as long. That's why the carbide that goes into a Sandvik Coromant 776 bit is meticulously controlled.

Sandvik, the world's largest manufacturers of brazed-in tungsten-carbide inserts for rock drilling, control every phase of production. Coromant carbide is scrutinised for impurities from the very first stages of processing the tungsten ore, right through to the final inserts. Add to that Sandvik's special process of securing the insert to the body, employing an exceptionally strong bonding metal, and you know why a Coromant 776 bit lasts longer. In 1955, one billion feet were drilled with these inserts, all fitted to Sandvik Coromant bits or integral steels. *Nothing is more conclusive of the quality of Coromant bits than this figure.*



LOW QUALITY TUNGSTEN CARBIDE

These are unretouched, 1200-times enlarged microphotos. Above, carbide full of impurities. Those black marks are contaminations which are present when production and quality control are deficient. Contamination of this kind weakens the carbide and reduces its working life.



SANDVIK COROMANT TUNGSTEN CARBIDE

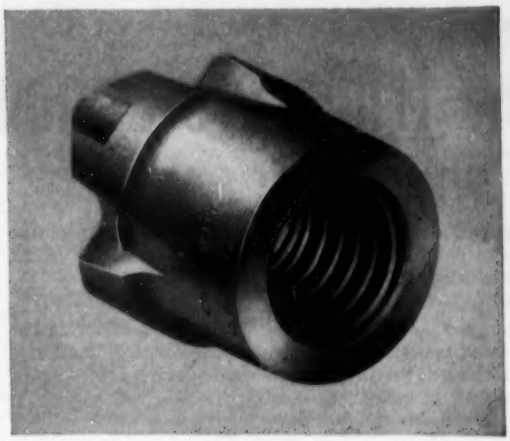
This is Coromant carbide. Notice the uniformity of size and the even distribution of grain. Coromant inserts are free of dangerous porosity and impurities—the reason they go further, have greater strength.

Nothing stands the strain like the Swedish body of a Sandvik Coromant bit

When you put the strongest possible tungsten carbide into a rock bit, the body has to be the strongest available to take the extra strain. That's why Coromant bodies are made of high-quality Swedish alloy steel. But that's not all. Inserts and clearance are cylindrically-ground and the insert ends precision-tooled to exactly the same height. This means *smoother* drilling and *smoother* holes, because the load is equally distributed on all four inserts. *Precision engineering such as this give Coromant bits a longer life!*

Nothing fits like the precision-milled threads of a Sandvik Coromant bit

In order to get a smooth profile of the highest accuracy, Coromant threads are precision-milled in a special thread-milling machine and not made with a tap. Precision-milling too protects the skirt from common fatigue failures.



SANDVIK COROMANT 776 BITS

and Sandvik Coromant integral steels are available in standard sizes through Atlas Copco, who, in their own field, are the world's largest manufacturers of rock drills. Contact any of these offices *today* for further information and a demonstration.

U.S., Atlas Copco Pacific, Inc., 930 Brittan Avenue, San Carlos, California. Atlas Copco Eastern Inc., P.O. Box 2568, Paterson 25, N.J.
CANADA, Atlas Copco Canada Ltd., Montreal, Airport, P.Q.
MEXICO, Atlas Copco Mexicana S.A., Apartado Postal 56, Torreon, Coahuila.

Atlas Copco

Manufacturers of Stationary and Portable Compressors, Rock-Drilling Equipment, Loaders, Pneumatic Tools and Paint-Spraying Equipment

1 **New neoprene insulation compound** gives Securityflex cable physical toughness on the INSIDE as well as the outside . . . resistance to puncture, flame and crushing.

2 **New flat stranding of grounding conductor** prevents broken wires – thus assuring continuity of operation. Full 50% wire gives peak electrical protection.

2-YEAR STUDY GIVES YOU A

New Triple Protection

shuttle car cable

Before designing the new Securityflex* cable, Anaconda engineers checked thousands of shuttle car cables of all makes to see why they failed.

They found the jacket often looked fine, but constant bending, flexing or excess tension had broken insulation or snapped conductors. To combat cable "heart failure"– Anaconda's new Securityflex cable provides *triple protection inside* to match tough outer strength.

3 New Advantages

1. Rugged high-grade neoprene insulation greatly increases resistance to puncture, flame and crushing.

2. Improved stranding of ground and power conductors prevents broken wires–assures continuity of ground.

3. Nylon breaker strip increases short circuit protection. Nylon jacket reinforcement also adds to cable strength and prevents wicking of moisture.

Full 50% Grounding Wire

In addition–full, 50% grounding wire insures greater electrical protection, longer life, and extra safeguard against excess tension. Anaconda's flat, service-proven grounding wire allows more cable on reel–will not cut insulation if cable is crushed by runovers. Millions of feet of new Securityflex have been sold without a reported failure of grounding conductor. Insist on full-size grounding conductor for safety.

Ask the Man from Anaconda or your distributor for details. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

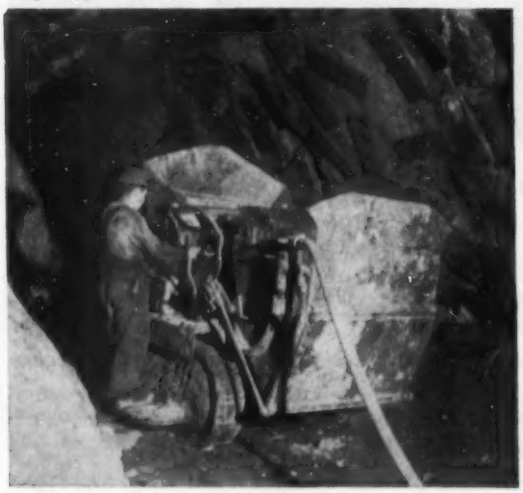
*Reg. U. S. Pat. Off. 56340

3 **New nylon Anti-Short Breaker Strip*** gives Securityflex amazing crush resistance . . . minimizes short circuits between conductors even under heavy impact.

ASK YOUR ANACONDA® DISTRIBUTOR FOR MINE CABLE

Powerful crowding action fills this big, half-yard capacity bucket in any muck pile. Fast discharge and near-perfect clean-up at the face are time-saving abilities of the Eimco 630.

An Eimco 630 "moves in" for another load, operated by easy-to-reach, easy-to-work controls.



The Eimco 630 Crawler-Excavator is gaining more respect for its adeptness in a greater variety of underground mucking tasks by responding favorably to new tests of its versatility.

One recent field report points to an Eimco 630 Transport-Loader that has been loading rounds much faster and getting better "clean-outs" during five months of competition with a 48" box scraper with a 50 h.p. slusher.

Near-perfect clean-out by the 630 increases drilling efficiency. To get 630 clean-out results in a slusher operation, requires use of snatch blocks along the foot and hanging walls and final clean-up at the face thru hand shoveling.

So outstanding has been the Eimco 630's performance, future stopes are being planned for maximum utilization of its many operating advantages.

The 630 Transport-Loader with integral, automatic discharge, 30 cu. ft. hopper, is very profitably in use for short hauls and floor-level dumping in a wide variety of industries.

And—like all 630 excavator-dozer units, the transport loader has that extra maneuverability thru independent track operation—control simplicity and the big, half-yard bucket capacity.

BEFORE YOU DECIDE ON A MINING PATTERN, investigate the EIMCO 630. You'll find—as others have—it pays to plan your mining strategy around operating advantages of the versatile 630.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Cleveland, Ohio Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-820

Tacoma City Light photo

Trimming a cliff in Washington for $138 million Mayfield Dam

High above the Cowlitz River, near Mayfield, these drill runners are putting down blast holes with Bethlehem Hollow Drill Steel, shaping the cliff face for the construction of an abutment for Tacoma City Light's Mayfield Dam. The concrete-arch dam is part of a $138 million hydroelectric project for the City of Tacoma. It will be 185 ft high and 850 ft long, with a 205-ft-wide spillway section. Here, as on construction and mining jobs across the nation, Bethlehem Hollow is giving dependable, economical performance. *Contractors:* Arundel Corp. and L. E. Dixon Co. *Tunnel subcontractor:* Gibson & Roberts, Inc. Drill steel reconditioning by Senter Tool Service.

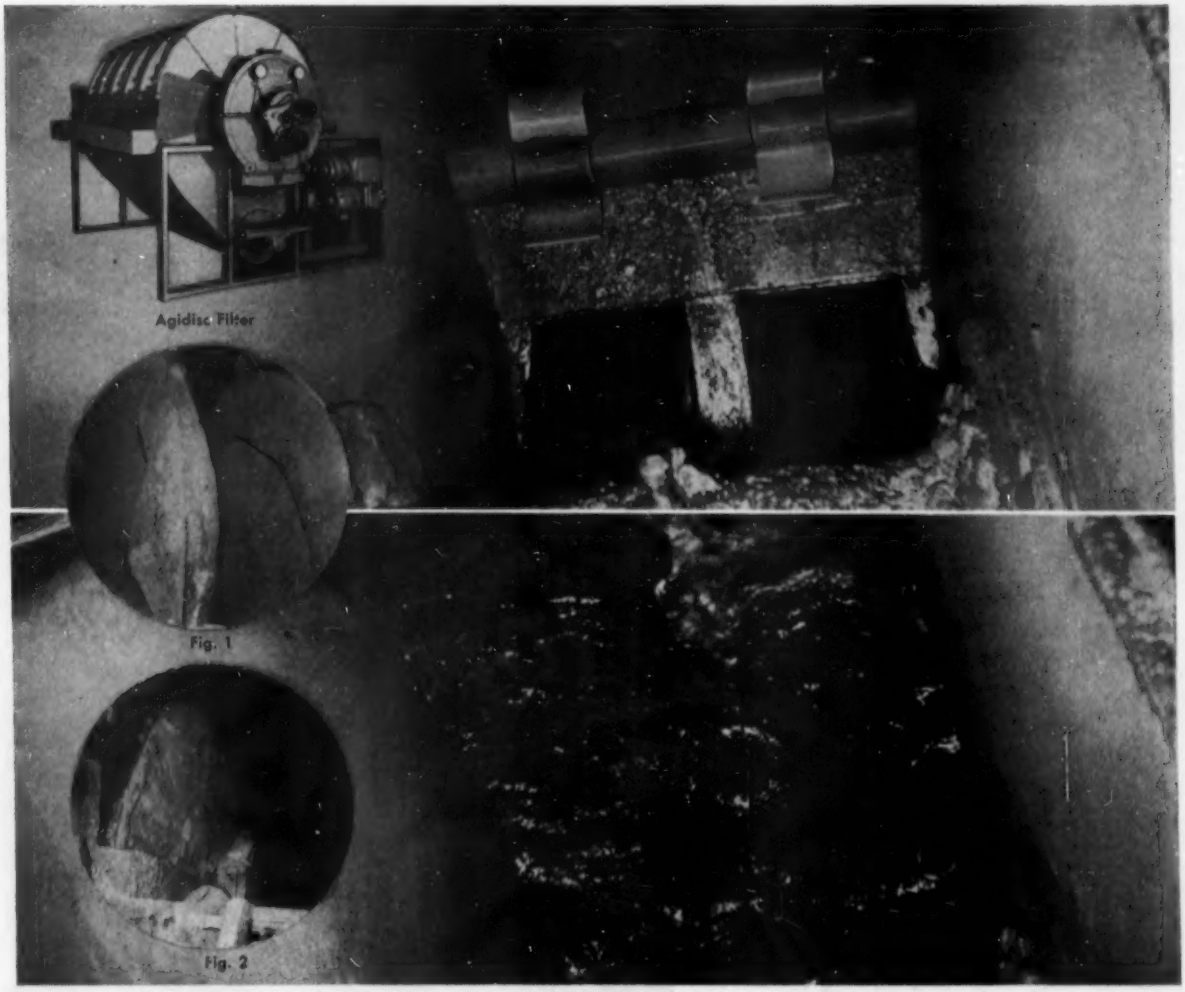
Leading distributors and converters throughout the West handle Bethlehem Hollow Drill Steel.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL



THE EIMCO AGIDISC FILTER GETS UNIFORM RESULTS

The Eimco Agidisc is the only disc type filter with proven ability to get uniform cake formation from all fast settling solids.

A veteran superintendent of a concentrator, processing complex metallurgical slurry says, "The Eimco Agidisc is the one really effective means to get uniform particle suspension in disc filter tanks."

This magnetite pelletizing plant uses five 6 X 6 Eimco Agidiscs. Each filter is capable of processing 640 long tons of concentrate per 24 hour day. The feed contains 63% solids at 62% minus 325 mesh. Specific gravity is 5.0. The filter cake has 7.5% moisture.

Experience has taught filter station personnel that **uniformity** is the key to good operating results when fast settling particles are in the feed. Only the Eimco Agidisc Filter gives strong, properly directed agitation.

Insufficient agitation results in a classification ring on the periphery of the disc with thin, slimy cakes near the center. Disadvantages here are high cake moisture and low capacity. (See Fig. 1).

If agitation is too violent, the result is a scouring action on the periphery of the disc. Disadvantage here is principally low capacity. (See Fig. 2).

The Eimco Agidisc eliminates both of these costly formations as shown in figure 3. (One disc is removed to show construction). A variable speed reducer promotes proper surface movement. The Eimco gets **uniform** cake dryness; **uniform** cake thickness; **uniform** particle dispersion and **uniform** tonnage consistent with feed.

The Eimco Agidisc can help your operation by increasing tonnage and lowering moisture content in the cake. Write for complete information today!

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City
Research and Development Center—Palatine, Ill.

New York, N. Y. Chicago, Ill. San Mateo, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Cleveland, Ohio Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-221

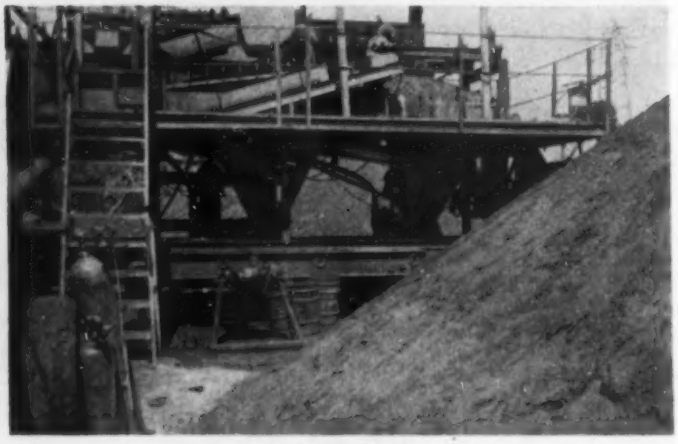
NOW all the advantages of AKINS HMS Separators and AKINS EXPERIENCE

IN A *TRANSPORTABLE* UNIT

1938...Akins on Heavy Media. Experimentation on the use of Akins Spiral Classifiers in making a sink and float separation was first started in 1938. Continuous research, on pilot plant and commercial scales, resulted in development of the Akins Separator...a modification of the classifier which retains all of the important mechanical features of the Akins. In 1944 the first 78" Akins Separator was placed in successful operation by one of the large iron mining companies.

This compact unit, mounted on a flat bed truck trailer, was designed and built by S. E. Hollister and R. G. Godfrey, Consulting Engineers, Los Angeles. It is ideal for small commercial operation or for low cost pilot plant work. It includes a 24" Akins Separator and a 16" Akins Densifier.

The unit shown has been used successfully on two different manganese oxide ores, handling 25 tons per hour. On one property it easily met the stockpiling program specifications; on the company's other property it produced a concentrate with better than 40% MnO_2, for direct carload shipment.



This unit is achieving outstanding results, in both grade and recovery, through extraction of middlings... **taking advantage of Akins' ability to make a 3-product separation in one machine, requiring only one media circuit.**

Proved Facts about AKINS SEPARATORS

• 3-product separation in one machine, requiring only one media circuit. • Start-up under full load. • Entire vessel is visible and accessible. • Variation in rate or grade of feed is not detrimental. • Large pool area and volume minimize tramp refuse in the product and facilitate better recovery of values from fine sizes. • Gradation of gravity and viscosity from feed entry point to sink removal point provides natural cleaning of sink, and allows circulation of media at lower gravity and viscosity.

YOU can have the advantage of this AKINS EXPERIENCE just write, wire or call...

COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

EIMCO 105 -- MORE POWER FOR MORE WORK

Eimco 105 Tractor-Excavators are balanced to give maximum work efficiency in every phase of digging and loading. Compare these figures—(A) 39,200 pounds of digging force at the bucket lip as the 105 moves into the rock pile; (B) 39,200 pounds of lifting capacity for breakout power.

This power gives the operator the same potential in productive capacity as he would have if you bought him a boom type shovel costing three to four times as much.

How does Eimco design a small (1½ yard) Tractor-Excavator to outproduce every other machine in its price range?

The answer to this is Eimco's unique Tractor design which provides better balance, lower center of gravity and delivers full engine horsepower to the bucket at all times.

Eimco also makes it easier to operate the 105 Tractor-Excavator. The operator sits up front where he can see what he is doing. Two small handles, easily held in one hand, control all movements of the Tractor. The operator does more work with less effort, stays efficient the entire shift.

Other firsts in the Eimco 105 Tractor-Excavator include (1) independent track control so that one track can be run forward while the other turns reverse; (2) separate final drives for each track; (3) full track oscillation on the tractor when equipped with loading or excavating attachment; (4) elimination of master clutch and drag-track steering; (5) Unidrive transmission in which gearing always rotates in the same direction; (6) all alloy steel construction; (7) clutches that never need adjustment — and many other exclusive features.

See these completely new tractors as Bulldozers, Excavators or Loaders working near you. Write for complete information.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Cleveland, Ohio Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-322

In cramped quarters like this, Tournapull Rear-Dump turns in dump position, which moves rear wheels forward for extremely short wheel-base. With bowl raised, 22-ton capacity C Tournapull, shown, turns 180° in only 20' 8" wide area, without backing.

Short 180° turns

boost pit output, cut handling costs

If you are interested in cutting cycle time on your pit hauls, consider Tournapull Rear-Dumps.

These high-production units are extremely maneuverable, can back into a shovel or restricted dump area faster than any haulers on the market. They make 180° turns by power steer thru geared king-pin in less than their own length. They eliminate time normally wasted maneuvering back and forth to turn in narrow quarters. They also frequently eliminate expense involved in construction of skid-plates or special turn-around areas.

Even where space is unlimited, rig's 90° prime-mover-turn gives you faster cycles. At the shovel, fast-maneuvering Tournapull Rear-Dump swings in and positions in 1 quick move. Loading unit need not sit idle while hauler operator wastes time on a wide sweeping turn, and a long, slow back-in. Quick, safe spotting saves additional production time at grizzly or dump.

Simplicity reduces maintenance

A great deal of your usual maintenance expense is also eliminated because of the simplicity of Tournapull's turn mechanism. Steering involves only an electric motor, connected to a rugged ring gear king-pin shaft. A flick of operator's finger activates motor . . . causes prime-mover to pivot up to 90° around trailing unit. Turns are made quickly, regardless of footing. There are no front steering knuckles, no reach rods, no complicated mechanisms to get out of line, maintain, or repair.

Check these, and all the other advantages of Tournapull Rear-Dumps. See for yourself how they speed haul cycles and cut costs. Write or call, any time, for owner-verified production studies and specifications. There's no obligation.

Model	Capacity	HP	Overall Length	Width req'd. for 180° turn Travel position	Dump position
D	11 tons	138	24'10"	24'8"	18'8"
C	22 tons	208	29'9"	28'8"	20'8"
B	35 tons	293	35'10"	35'	27'

These features, too, cut your hauling costs

Hauls anywhere—Travels safely over narrow haul roads, paved highways, city streets. . . hauls cross-country over terrain, thru muck, rock, and soft fill.

Dumps fast, clean — Electric motor lifts body quickly to any desired dump angle . . . bowl tips behind rear wheels for clean over-bank spill. Streamlined body sheds material readily.

Cuts weather delays — Power-transfer differential applies extra power to wheel on firmest footing . . . pulls rig through mud, sand, soft materials.

Rugged body loads easily—Big bowl opening is easy loading target. Three layer, *all-steel* bowl with tool-steel floor resists wear and shock. Available with optional tailgate.

Improves safety — More than 4 times the braking surface of ordinary haulers plus optional electrotarder, low center of gravity, excellent visibility, front-wheel drive, easy control, all contribute to maximum safety.

Reduces fatigue — Big tires and air-foam cushioned seat smooth out ride for operator. Electric power steer and 2-way power dump make work easy.

Insures future earnings — Behind basic prime-mover you can interchange other trail units: scraper, bottom-dump, lift-and-carry crane, logging-arch, flat-bed hauler. Keeps your Tournapull busy at a profit all year-around.

Tournapull—Trademark Reg. U.S. Pat. Off. R-1168-M-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

HOW USS "T-1" STEEL IMPROVES THESE PRODUCTS:

Sizzling Hot. By redesigning with USS "T-1" Steel, crane hooks for 250-ton ladles at U. S. Steel's Edgar Thomson Works were reduced in thickness from 8½ inches to 6 inches. The resulting weight saving of 3 tons permits an increase in actual crane capacity. The ladles, too, were redesigned with USS "T-1" Steel. All told, the weight saved adds 20 net tons to the capacity of each new ladle.

Screaming Cold. USS "T-1" Steel's amazing toughness and resistance to impact is serving "Operation Deepfreeze," the U. S. Navy's current expedition to Antarctica. Skis for rugged cargo sleds are made from ½-inch plate of USS "T-1" Steel. In addition to exceptional strength (needed to keep down weight) and sub-zero toughness, good forming and welding characteristics were needed. Only USS "T-1" Steel met the requirements. The sleds were designed jointly by the U. S. Navy and Otaco, Limited, Orillia, Ontario, Canada.

28 Million Pounds of wet, abrasive coal are handled each day at this steam-electric generating station. And USS "T-1" Steel is being used at points of severe wear in coal chutes and hoppers, pulverizer feed pipes and exhaust pipes, and for liners of ash collectors. USS "T-1" Steel's durability under impact and impact abrasion, its great tensile strength and its good weldability are often essential in rugged coal handling equipment. USS "T-1" Steel can add service life and cut repair and maintenance costs in many types of heavy-duty equipment.

Repair Reduces Downtime. In this coal stripping operation, time costs more than any other item; and *lost* time, caused by breakage and wear of power shovel parts, was costing far too much. So the owner, Putnam & Greene, Inc., Philipsburg, Pennsylvania, started using USS "T-1" Steel for repair work. As a result, size and weight of parts have been reduced, while durability has been improved substantially. What's more, USS "T-1" Steel's good weldability speeds repair work.

How It Can Help You

USS "T-1" Steel, with its high minimum yield strength of 90,000 psi and its minimum tensile strength of 105,000 psi, can help you design or build lighter-weight equipment that will last longer. Its unusual toughness can help you design or build equipment capable of taking heavy impact and abuse at sub-zero temperatures. Its excellent weldability can help you cut the cost of fabricating highly stressed parts, and to reduce repair and maintenance expense. Its good creep rupture strength can help you put more durability in equipment that operates at temperatures as high as 900 degrees F.

Somewhere in your operation, versatile USS "T-1" Steel can help you. Write, wire, or phone United States Steel, Room 5444, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

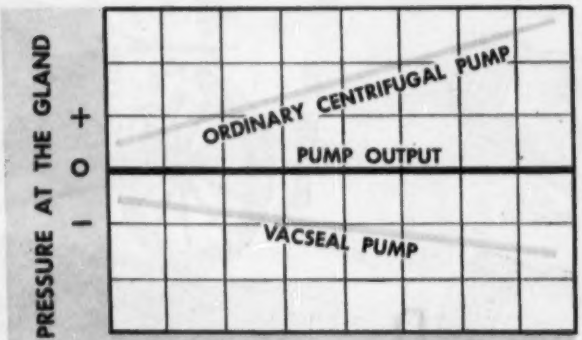
USS

UNITED STATES STEEL

VACSEAL PUMP

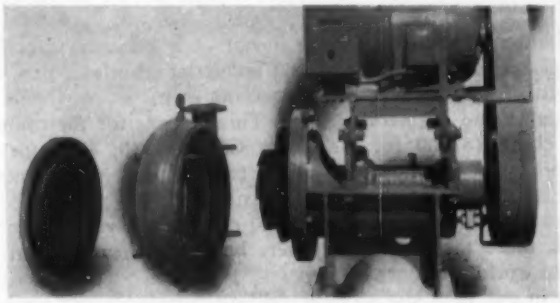
"The harder it pumps the better it seals"

VACSEAL supremacy rests on the *original* VACSEAL impeller design that eliminates leakage at the pump gland. The harder it works the tighter it seals—while the conventional centrifugal pump shows pressure build-up at the gland with increase of speed. Because of this advanced pump design, materials being pumped do not come in contact with the packing or the shaft sleeve. Result — no leakage and greatly reduced shaft wear! The rugged VACSEAL handles all types of material, including: abrasive pulps, acid and corrosive solutions, tailings, semi-solids and many other difficult to handle materials.

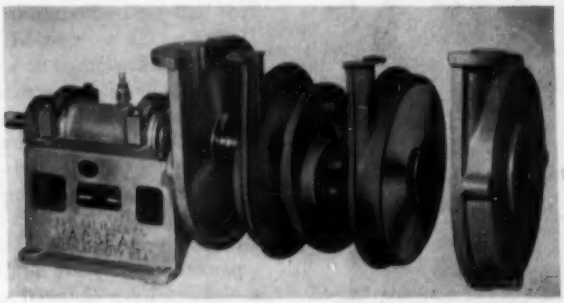


When VACSEAL PUMP is operating the pressure on the gland is less than atmospheric pressure.

VACSEAL PUMPS are available in many models, including: fixed or replaceable rubber linings and all alloy types and in sizes ranging from 1½" to 8". Write for additional data and performance records on these pumps. No obligation.



Fixed rubber lining or all alloy pump



Pump with replaceable rubber liners

Leaders in Experience and Service

THE GALIGHER CO.

METALLURGICAL DIVISION

CONSULTATION • ORE TESTING • PLANT DESIGN

HOME OFFICE: 545-585 W. 8th South
P. O. Box 209
Salt Lake City 10, Utah
EASTERN OFFICE: 921 Bergen Ave.
(Room 721)
Jersey City 6, New Jersey

VP 588

GALIGHER PRODUCTS: AGITAIR® Flotation Machine, VACSEAL Pump, Geary-Jennings Sampler, Acid-proof Sump Pump, Geary Reagent Feeder, GAL-CLONES, Laboratory AGITAIR® Flotation Machine, Laboratory Pressure Filter, Laboratory Ball Mill, Rubber Lined and Covered Products, Plastic Fabrication.

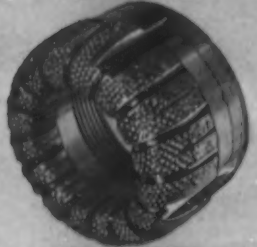
TRUCO CORING BIT

TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS



TRUCO STANDARD OIL FIELD BIT

FINEST QUALITY DRILL BORTZ

1910 *Our 46th Anniversary* **1956**

the 20 horsepower miracle

Pioneering was fashionable in Detroit 46 years ago and we, with our pioneer idea of expertly selected industrial diamonds, had lots of company and customers among the new car and truck builders who were springing up at the average (and incredible) rate of half-a-dozen a month.

And, if we needed inspiration and encouragement in our early business years (and sometimes we did) it was right at hand in the social and industrial miracle of one little car that had been launched with an idea just as pioneering as our own.

Until then, horseless carriages had been for the rich. This car was for the common man. It was light, simple, cheap ($1100 for the Town Car in 1910; $260 for the Roadster in 1924) and—indomitable. With a spunky little four cyinder, 20 horsepower engine, it performed impossible feats of transportation and endurance.

Originally, production had been hopefully set at 25,000 cars for the year but in the twenty years of its existence, more than 15,000,000 were built and they changed the pattern of daily life all over the world.

Cars have changed vastly in our time and so have drilling techniques and we have seen our Truco Engineered Diamond Bits develop from a long-past experiment to a world-wide success, acknowledged throughout the drilling industry because of their irresistible cutting power in any formation and because they save rig time and reduce footage costs. May we send you the Truco Diamond Bit Catalog?

TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

IN MINNESOTA . . . AND THE WORLD OVER

Profit Starts in the Pit

with Bucyrus-Erie Electric Shovels On the Job

On the Mesabi range, more ore is mined with Bucyrus-Erie Ward Leonard electric shovels than any other make. The 8-yd. Bucyrus-Erie 190-B, shown here, is loading for a large mining company — only one of a fleet of Bucyrus-Eries which they operate.

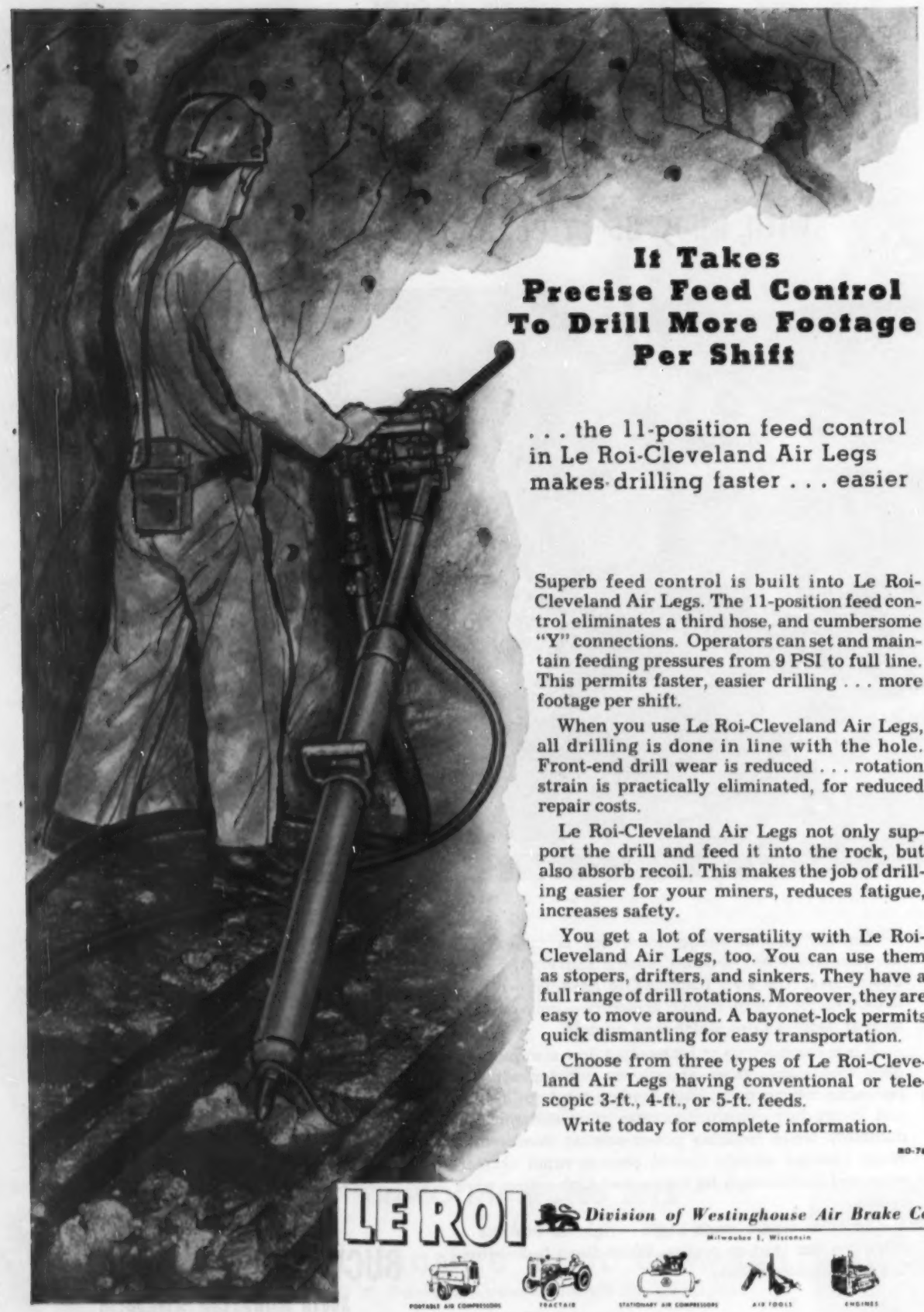
It is a combination of high-output, low cost performance that makes these shovels so popular with experienced mining men. Their modern front end design and heavy-duty construction offer great strength and durability while reducing power-wasting deadweight. Ward Leonard electric control permits rapid acceleration and deceleration for high-speed, high-output work cycles.

Cut costs where costs begin — right in the pits — and get a fast start on profits. Write direct to Bucyrus-Erie for complete details.

113L56

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin



It Takes Precise Feed Control To Drill More Footage Per Shift

. . . the 11-position feed control in Le Roi-Cleveland Air Legs makes drilling faster . . . easier

Superb feed control is built into Le Roi-Cleveland Air Legs. The 11-position feed control eliminates a third hose, and cumbersome "Y" connections. Operators can set and maintain feeding pressures from 9 PSI to full line. This permits faster, easier drilling . . . more footage per shift.

When you use Le Roi-Cleveland Air Legs, all drilling is done in line with the hole. Front-end drill wear is reduced . . . rotation strain is practically eliminated, for reduced repair costs.

Le Roi-Cleveland Air Legs not only support the drill and feed it into the rock, but also absorb recoil. This makes the job of drilling easier for your miners, reduces fatigue, increases safety.

You get a lot of versatility with Le Roi-Cleveland Air Legs, too. You can use them as stopers, drifters, and sinkers. They have a full range of drill rotations. Moreover, they are easy to move around. A bayonet-lock permits quick dismantling for easy transportation.

Choose from three types of Le Roi-Cleveland Air Legs having conventional or telescopic 3-ft., 4-ft., or 5-ft. feeds.

Write today for complete information.

80-76

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

The Engineer's Field Report

CASE HISTORY

LUBRICANT Calol Vistac Oil

LOCATION Utah

Tough oil film protects mine roof bolters operating in water and heavy abrasive dust

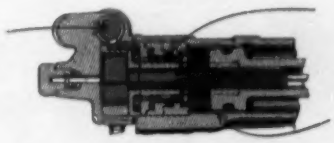
WORKING CONSTANTLY in heavy abrasive dust, high humidity and water, these Joy roof bolters (above) eliminate crossbar timbering, for safety and increased production in one of Utah's largest coal mines. Lubricated exclusively with Calol Vistac Oil 28X since first put in service, these air tools drill holes, hammer bolts and tighten nuts on steel bearing plates. Bolts up to 8 feet long are rammed in to refusal at pressures up to 3,000 lbs. psi. The master mechanic for underground operations at the mine reports: "Calol Vistac Oil has proved completely satisfactory for this tough service. It continues to lubricate and protect these machines even under our most difficult dust and water conditions." Calol Vistac Oil is also used in all other air equipment in the mine.

FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

Why CALOL Vistac Oil cuts costs in air-tool equipment



Atomizes quickly and completely—carries evenly over all parts. Prevents excessive fogging and has no unpleasant odor.

Additives help form tenacious, oily, pressure-resistant film in wet or dry conditions—cuts wear and power loss. Small quantity lubricates efficiently.

Resists high temperatures and oxidation. Stays fluid at low temperatures.

SwitchTractor at uranium mine cleans-up pit-floor, spots rail-cars

At rail terminal, Anaconda SwitchTractor quickly spots string of ore cars in-between dozing chores. Versatile rubber-tired machine can move 5 loaded or 18 empty cars up a 1 per cent grade...is not tied to tracks as expensive switch engines are.

Cleaning up on ledge, SwitchTractor dozes loose material over bank to shovel below. Note standard railroad coupler on rig. It can speed from pit, plant or dump to car-spotting location as needed. It reaches a job site a mile away in less than five minutes.

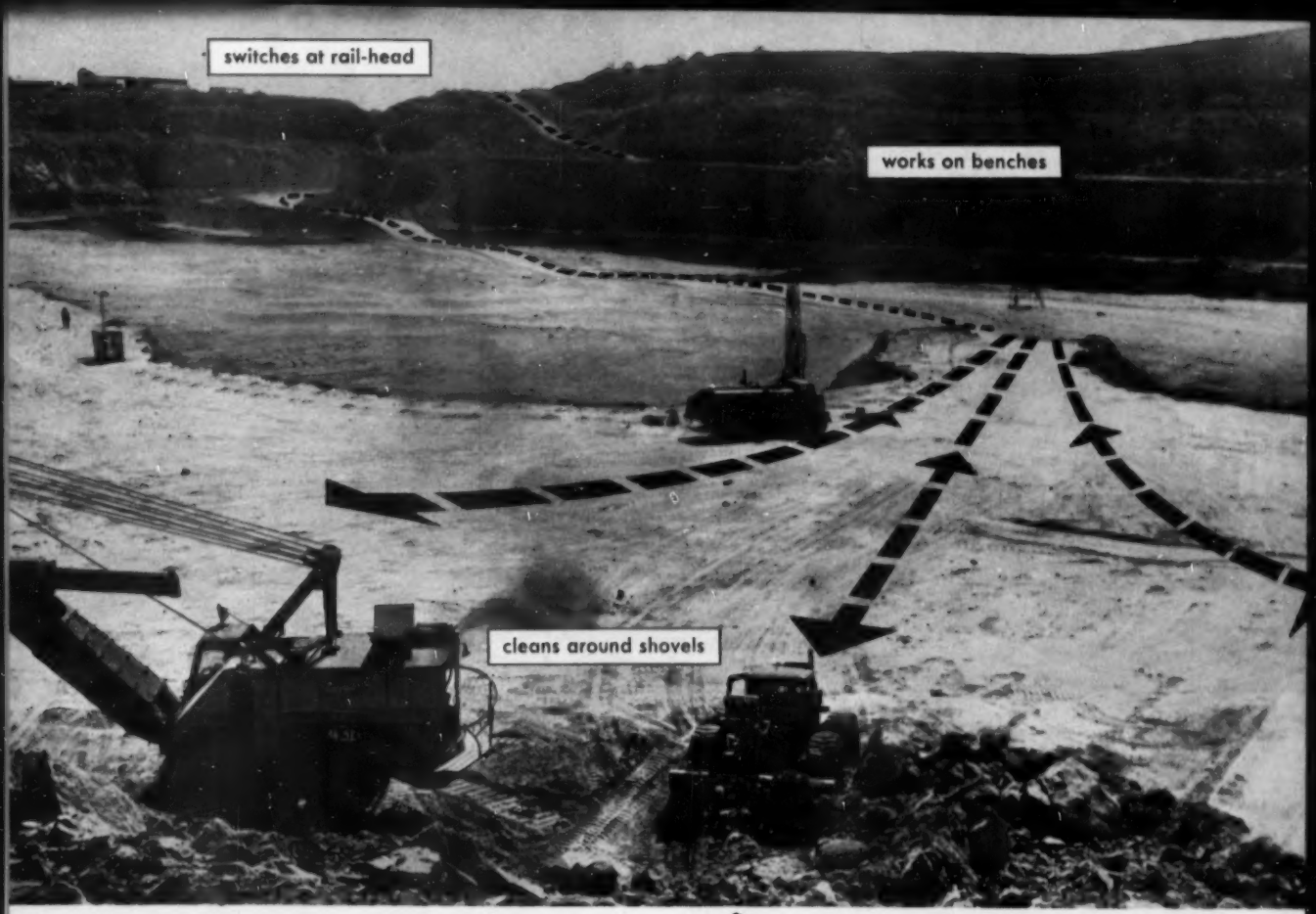
In the New Mexico desert, 40 mi. west of Albuquerque, The Anaconda Company operates the Jackpile Mine — a large open-pit uranium mine. Ore-bearing rock is loaded into a fleet of 19 dump-trucks by 4 mining shovels.

Anaconda uses a fast, rubber-tired LeTourneau-Westinghouse SwitchTractor to spot ore-cars at the mine. The tractor also "keeps house"—dozes, hauls, and cleans-up debris over many miles of mine-ledges, pit-floors, and haul-roads on a daily basis.

Best feature of this versatile rubber-tired SwitchTractor is that it never stands idle during slack periods at the rail-head. When not needed as a switcher, rig cleans-up around shovels, pushes in toes of stockpiles, hauls equipment trailers, patrols pit-floors and haul-roads.

Mobility pays off

On a widespread operation like the Jackpile Mine, distance is a great obstacle. Speedy SwitchTractor can run to the next task fast *under its own power.* SwitchTractor's big, low-pressure rubber tires absorb the pounding and grinding of mine-work without damage. Around pit and plant the machine's big deep-lug tires are constantly rolling over rock and abrasive materials without damage or unusual wear.



Sketched lines show range of SwitchTractor at Anaconda's New Mexico Mine. In foreground, rubber-tired tractor cleans-up around a shovel. It dozes over entire pit-floor and on benches bordering the excavation. Railhead is only a few minutes drive away.

Heavy-duty tractor

SwitchTractor is a heavy-duty tractor that can doze 2½ to 3 yards per pass. Rig's weight with blade is close to 16 tons; hydroflation (inflating tires with water) increases weight by another 10 per cent for added traction, on any surface.

"Pleased with its flexibility"

"We're pleased with the flexibility of the SwitchTractor," stated John P. Herndon, superintendent of mines. "Its ability to move fast from place to place on a scattered operation is of great value." Operator Lorenzo Reed said, "It's fast and easy to run."

What is a SwitchTractor?

Basically, it's the well-known LeTourneau-Westinghouse 208 hp Tournatractor, equipped with a standard railway car-coupler on the rear.*

What will it do for you?

SwitchTractor will give you rubber-tired mobility in car-spotting plus handling heavy-duty hauling and dozing jobs. Tractor has more push-or-pull power than ordinary rubber-tired switchers. It saves switching time because it isn't tied to tracks like a switch engine. It does the work of a switch engine, but doesn't cost as much to buy or operate. It goes anywhere with its big, low-pressure tires that roll over tracks, ties, switches, ballast, curbs and paving without damage.

We'll be glad to survey your switcher and tractor problems and give you a specific report on advantages of a 208 hp, 17 mph SwitchTractor on your operation. No obligation. Why not write with brief description of your problem?

**If you already own a Tournatractor, it can easily be equipped with a car-coupler for double-duty SwitchTractor service on your sidings, yard, or pit tracks. Ask for details.*

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

MOVING

the richest hill on earth

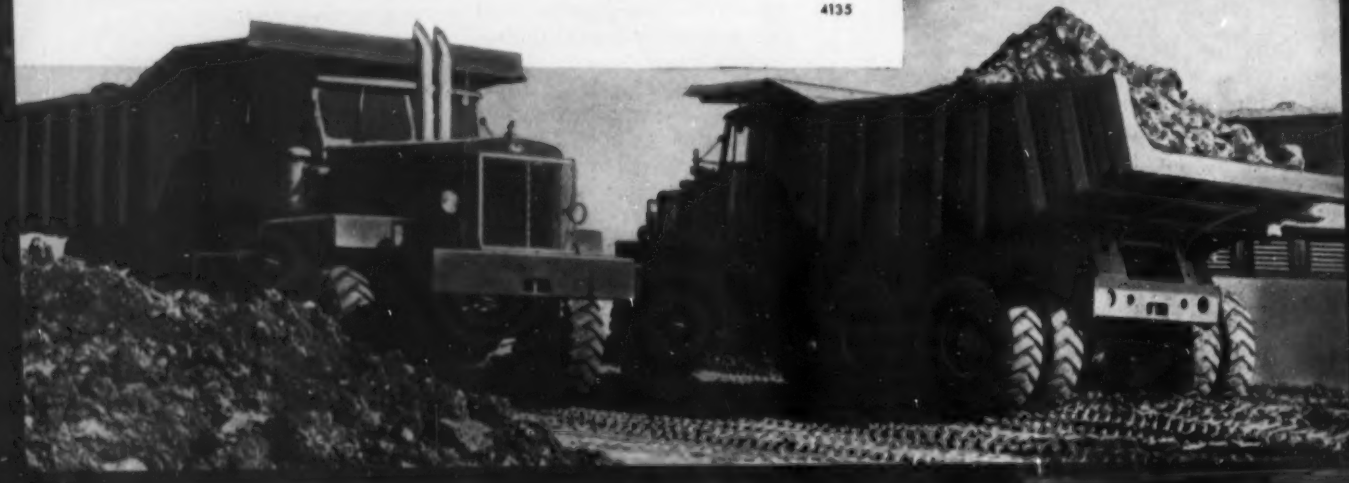
The open pit mining of copper ore from Montana's famous Butte Hill has added a new chapter to the long saga of underground mining at "the richest hill on earth."

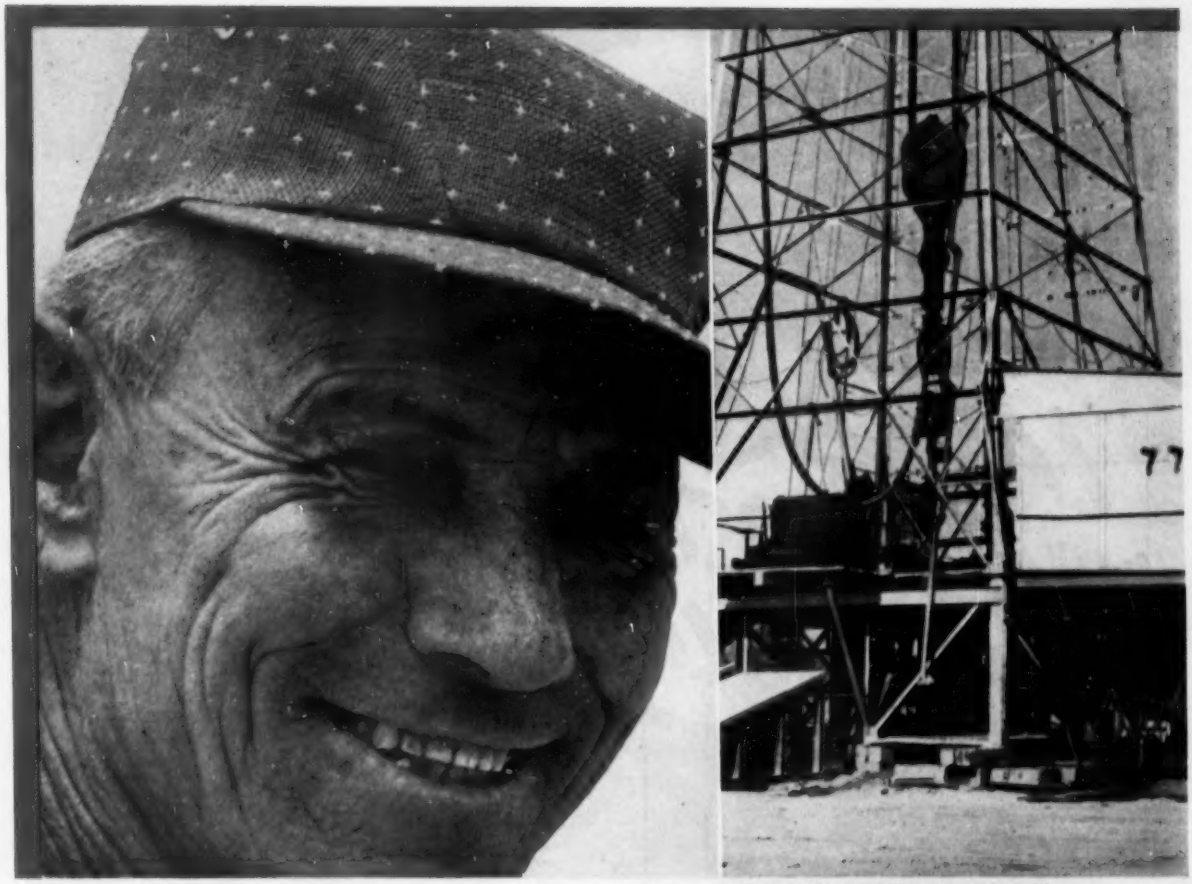
Begun as a pilot operation by the Anaconda Company late in 1954, the open pit work has proved so successful that plans are going ahead for mining a near-surface ore reserve currently estimated at 100-million tons.

When the F & S Contracting Company of Butte were awarded this vital earth-moving job, they chose Mack LRVSW's. The popularity of these six-wheel, off-highway dumpers has been firmly established by an unmatched record of dependable and economical service. Day and night, winter and summer, these "big boys" stay on the job—handling the heaviest loads under all conditions. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

4135





A typical Murray drilling rig powered with 220-hp. LRO Waukesha and 230-hp. V-12 Le Roi engine.

How a steak dinner saved me $1,000 a day!

by L. D. Murray, Murray Drilling Co., Houston, Texas

"Engine failure due to overheating used to be a big problem when I was drilling in West Texas... downtime was costing me as much as $1,000 a day.

"Conditions were the worst I've ever encountered before or since. There were no prevailing winds to head the engines into. We were drilling 13,700-foot wells at an altitude of 4,200 feet and temperatures often ranged upwards of 100°. Consequently, our engines were constantly running well above the boiling point and at times they'd pull the mercury down to 9 or 10 inches. You can guess the rest... with expenses running about $25,000 a year on each of six engines, we were not exactly getting rich.

"Well, one day I told a friend of mine about my engine troubles, and he told me if I'd buy him a steak he'd solve my problems. So I bought him that steak (it was even big by Texas standards), and he told me to try Union's T5X Motor Oil... just that and nothing more. So before we'd finished lunch, I ordered five barrels of T5X sent out to the rigs.

"From that day on, our engine troubles were over. Water temperatures held at 190° and oil consumption dropped from 10 gallons to 1, sometimes even half-a-gallon per day. Instead of changing oil every Sunday morning, we found we could run T5X Motor Oil 500 hours, changing it and the filters every third or fourth Sunday. And would those engines deliver on T5X! If I had to shut one down for any reason, the other two would pull the load.

"To make a long story short those engines stayed on the line for three years after that, using only T5X, and the only expense aside from routine maintenance was an occasional tuneup. I think that Union T5X is so far ahead of any other motor oil, it's impossible to compare them."

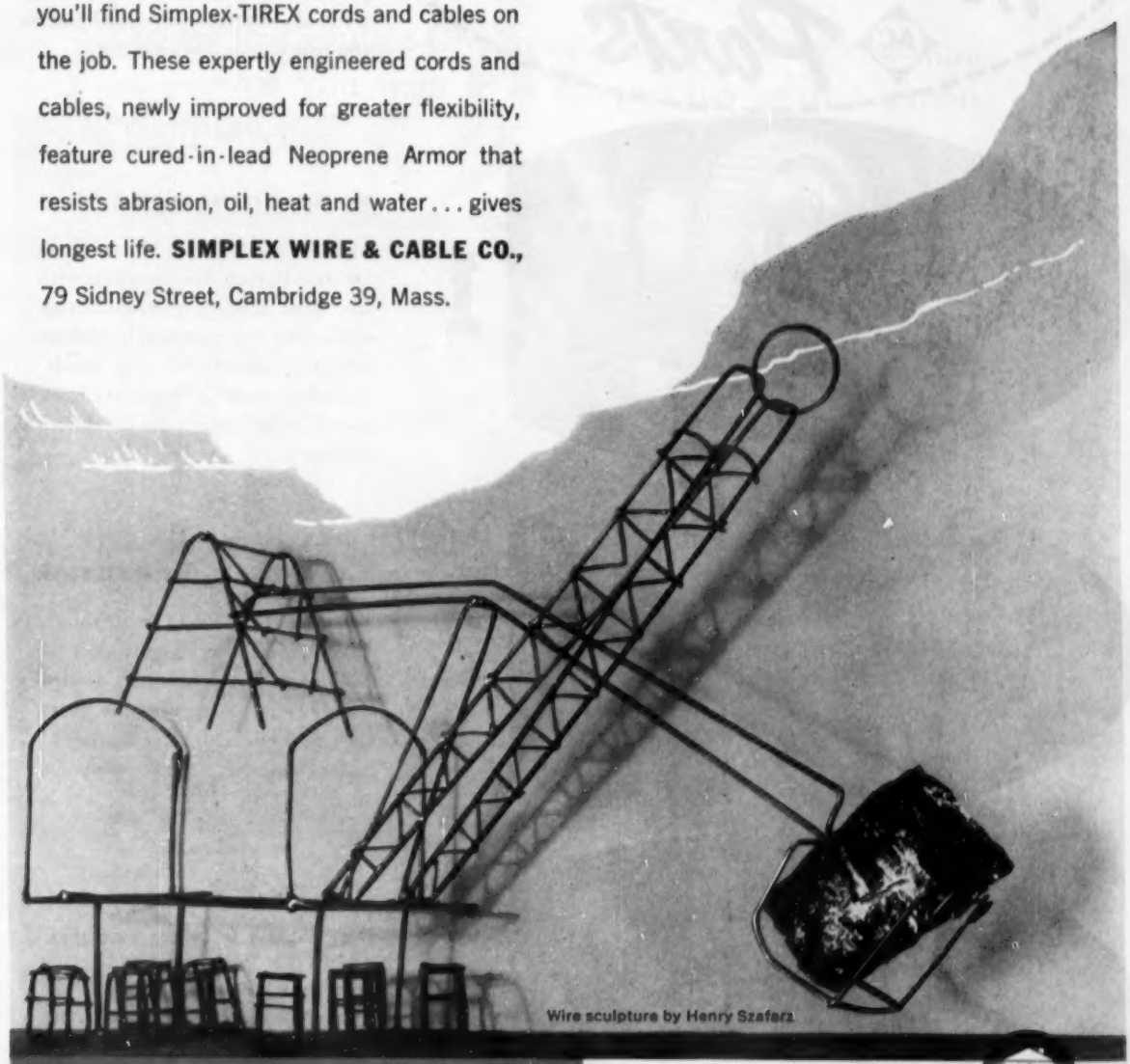
What more can we add except to remind you that T5X, the *amazing* purple motor oil, is immediately available from your nearby Union Oil representative.

UNION OIL COMPANY 76
OF CALIFORNIA

Los Angeles: Union Oil Bldg. • **New York**: 45 Rockefeller Plaza • **Chicago**: 1612 Bankers Bldg. • **Philadelphia**: Eastwick Ave. & Edgewood St. **Dallas**: 313 Fidelity Union Life Bldg. • **Kansas City, Mo.**: 612 W. 47th St. **New Orleans**: 644 Nat'l Bank of Commerce Bldg. • **Boston**: 214 Harvard Ave

Every Bite is a Payload

The effective use of power equipment is the very essence of successful mining operations. And everywhere that power is used in mines, you'll find Simplex-TIREX cords and cables on the job. These expertly engineered cords and cables, newly improved for greater flexibility, feature cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water... gives longest life. **SIMPLEX WIRE & CABLE CO.,** 79 Sidney Street, Cambridge 39, Mass.



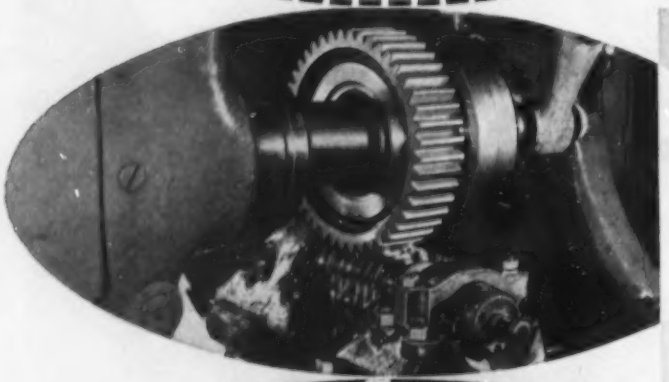
Wire sculpture by Henry Szafarz

Shovel Cable Type SH-D

Simplex
TIREX

Important reasons why it pays to use True Original Parts

Allis-Chalmers True Original Parts start right. Each benefits from one of industry's most intensive metallurgical research programs. And each is designed by experienced construction machinery engineers to do a specific job . . . with ample capacity to carry a full share of the work load just as the new equipment part did.

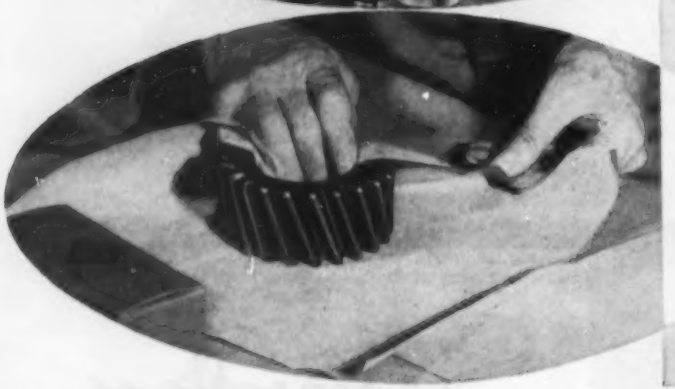


1 PRECISION-MADE

Skilled craftsmen bring True Original Parts to life—working with the most modern manufacturing equipment and meeting the highest industrial standards. The result: precision-made parts get full work power from your Allis-Chalmers machinery.

2 CAREFULLY INSPECTED

True Original Parts go through rigid original-equipment inspection and testing processes to assure long-life service. For example, gears are checked again and again for perfect meshing . . . for true balance . . . for full capacity.



3 PROPERLY PACKAGED

You want your parts factory-new . . . and that's how you get True Original Parts. Many are specially treated . . . then sealed and packaged against rust, dust and damage.

A country-wide network of dealers stock ample supplies of True Original Parts. Whether you're working in one area or across the country, you can depend on reliable parts service close to your job from your Allis-Chalmers Construction Machinery dealer.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

In the Carpco Group it's —

Carpco
EXPORT CORPORATION

To see that you get Carpco® equipment — *where* you want it — *when* you want it — Carpco has its own export company.

Map markers show the distribution of Carpco equipment, engineering projects, and sales agents throughout the world.

Carpco has active installations in over thirty countries.

From the smallest detail to completely integrated plants—it's Carpco *all over the world!*

Carpco

CARPCO RESEARCH AND ENGINEERING • CARPCO MANUFACTURING, INC.
CARPCO CONSTRUCTION CORPORATION • CARPCO EXPORT CORPORATION
JACKSONVILLE, FLORIDA, U. S. A.

Latest addition to the famous line of Timken carbide insert and multi-use bits:

New Timken® tapered

It's removable—

Lets you get full life out of drill steel —lowers reconditioning costs

It remains secure—

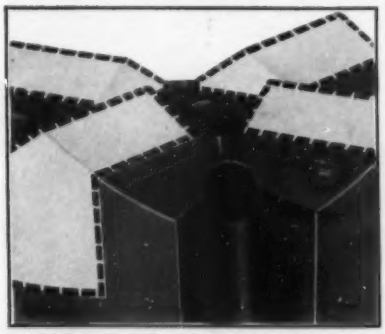
Precision tapered socket gives a secure union between bit and steel

The Timken Company offers its first tapered socket bit in the United States designed for air-leg drills and light stoping. It combines all the advantages of removable bits and carbide insert bits. It has frontal features that speed drilling and chip removal, give you the lowest cost per foot-of-hole. And its uniformly tapered socket provides a secure union, reduces breakage, permits quick bit changes.

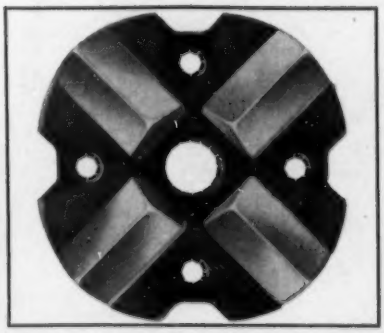
With the new Timken® removable tapered socket bit you'll get full life from your drill steel, cut your reconditioning costs, and you can change bits faster. And like other Timken carbide insert bits, the Timken tapered bit will hold its gauge longer, drill faster, cut your bit costs on really tough drilling jobs. Special analysis carbides give the Timken tapered bit superior wear-resistance, with added shock-resistance. Adds life to the bit. Other new mechanical features—specifically made to cut drilling costs on air-leg drills and light stoping—include five specially positioned front blowing and washing holes, and new extra clearance between wings for speedier chip removal.

This new Timken tapered bit can be reconditioned many times. And the body is made of special analysis Timken electric furnace fine alloy steel—with the finest physical properties obtainable in a rock bit today. For more details, get your free Timken tapered bit brochure! Write to: The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

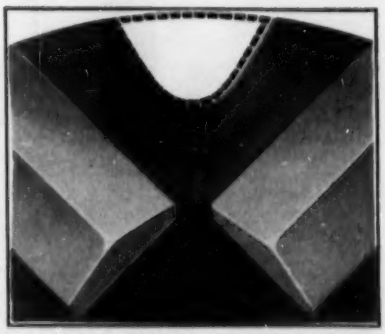
socket bit FOR AIR-LEG DRILLS AND LIGHT STOPING



LONGER BIT LIFE FROM WEAR-RESISTANT CARBIDES: Special analysis long-life carbide inserts give the 4-point "cross" cutting face superior wear-resistance, with added shock-resistance. This new cutting edge adds service life to your bit, *lowers your cost per foot-of-hole.*



JET ACTION FROM 5 FRONT HOLES SPEEDS DRILLING: Positioned to direct water against face with more velocity, wash away chips faster. Larger center hole, with plug dropped deeper for freer cutting action, less drag on bit. New frontal design adds life to bit, *cuts your cost per foot-of-hole.*



FASTER CHIP REMOVAL WITH DEEPER, WIDER CLEARANCE: Extra deep, wide clearance, works in conjunction with five front holes to speedily remove chips from the cutting face. Speeds drilling, makes cutting more efficient, adds life to bit, *helps to lower your cost per foot-of-hole.*

Improved Timken Threaded Carbide Bit

for all your other tough drilling jobs

An improved version of the famous Timken threaded carbide bit! Offering deeper, wider clearance between wings—and special analysis carbide inserts for superior wear-resistance—this new Timken threaded bit offers two additional features: new, *deeper undercut* under the heel, and a new, improved thread contact! The deeper undercut adds life to your bit by improving extra clearance for washed-back chips and abrading particles—and reduces drag on the bit during drilling. A new redesigned heavier wing also contributes to faster drilling and longer bit life. By adding service life to your bit these newly designed features *lower your drilling cost per foot-of-hole.* For more details, write for your free copy of our newest brochure on Timken Threaded Removable Rock Bits.

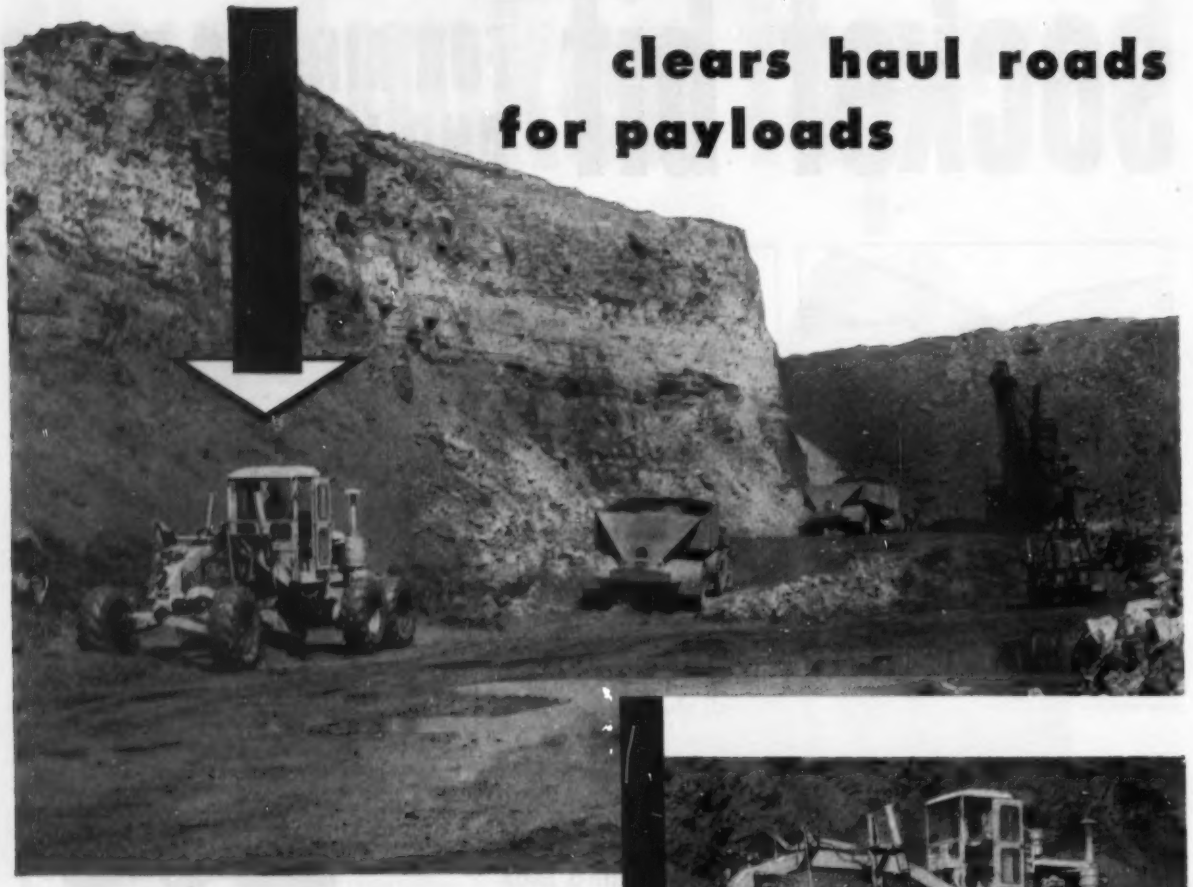
TIMKEN *REMOVABLE ROCK BITS*

TRADE-MARK REG. IN U. S. PAT. OFF.

Your best bet for the best bit for every job . . . threaded carbide insert, multi-use tapered carbide insert

HUBER-WARCO 5D-190 GRADER

clears haul roads for payloads



Efficient Power-Shift—No Clutch

The clutch on the 5D-190 has been eliminated. The power package of a 195 h.p. diesel engine, torque converter, power-shift transmission and tail-shaft governor, all team up to give top grader performance for even the TOUGHEST JOBS.

Patented hydraulic cab-controlled blade movement for 90° bank sloping and power-sliding moldboard are standard on the Huber-Warco 5D-190.

Power, weight and performance features of the Huber-Warco 5D-190 mean more work with fewer passes. The grader is easily maneuvered and will tackle ANY job with a minimum of effort and a maximum of performance.

Before you buy your next motor grader—you owe it to your company to investigate the Huber-Warco 5D-190. Make sure you get all the facts.

For a demonstration—see your nearest Huber-Warco distributor

HUBER W WARCO

HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

Prospecting. The 'Jeep' Truck is a workhorse for towing equipment over rough areas. With the extra traction of its 4-wheel drive, it reaches off-road areas where there's work to be done. Its partner, the Universal 'Jeep' is equally adaptable for prospecting needs.

How the 4-Wheel-Drive 'Jeep' family does more jobs better...faster!

Mobile Power. This 4-Wheel-Drive Universal 'Jeep' takes a mobile welder to out-of-the-way locations. With power take-off, the 'Jeep' also operates compressors, generators, drills and winches.

Transportation. The 4-Wheel-Drive 'Jeep' Truck transports men, tools and equipment between mines or wherever they're needed. Keeps maintenance service and supplies moving smoothly.

'Jeep' 4-Wheel-Drive vehicles are proving their value and versatility every day in every phase of the mining industry. From exploring or prospecting in remote areas to keeping maintenance work and service moving smoothly, they demonstrate their versatility. With the extra traction of their 4-wheel drive, they haul ore trailers in trackless mining — up steep inclines, or over rocky ledges. And for travel on good roads they shift easily into 2-wheel drive. Versatile 4-Wheel-Drive 'Jeep' vehicles pay for themselves in a short time because of their adaptability to many jobs, economical performance, long life and low maintenance costs. See your 'Jeep' dealer or write for information.

The 'Jeep'®

family of 4-Wheel-Drive vehicles

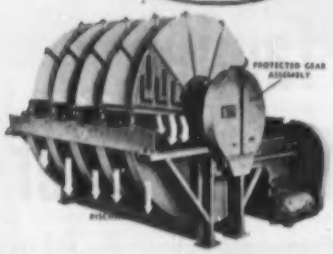
WILLYS...makers of the world's most useful vehicles

WILLYS MOTORS, INC., TOLEDO 1, OHIO

DENVER CAN SUPPLY COMPLETE EQUIPMENT FOR YOUR MILL

One Responsibility

Crushers, Screens, Feeders, Ball-Rod Mills, Classifiers, Jigs, Pumps, Samplers, Agitators, Conditioners, Flotation, Thickeners, Filters, Dryers, Ore Testing and Mill Design Services.



DENVER DISC FILTERS Give You These Advantages—

- DRIER FILTER CAKE, with positive gravity drainage of filtrate before blow-off.
- LOWER MAINTENANCE COST—all wearing parts are designed for long life.
- LARGER FILTER AREA per unit of floor space.
- WIDE OPERATING FLEXIBILITY—Two or more products can be filtered at the same time.
- Available in sizes from 2' - 1 disc to 9' - 12 disc.
- Drum Filters also available.

WRITE FOR BULLETIN NO. FG-B1.

DENVER High Capacity THICKENER is Completely *AUTOMATIC*

PROBLEM

Today's *new thickening techniques* require a new, high capacity thickener.

New flocculating agents that increase settling rates from 200% to 1000% mean *thickeners must move high tonnage* of fast settling solids and *handle overloads that build up fast.*

Faster settling takes place in less area and permits economy of smaller diameter thickeners.

SOLUTION

Spiral Rakes on DENVER *High Capacity* THICKENERS move solids to discharge in one revolution.

Completely automatic rake control handles overloads without attention and prevents damage to mechanism.

Low cost beam superstructure is used on sizes to 65' diameter. Simplified truss or bridge type is used from 65' to 125'.

COMPARE SPECIFICATIONS—PRICE

Every engineer planning a new thickener installation will want to study DENVER specifications. Compare sand raking capacity; shaft diameter; rugged, heavy-duty construction; totally enclosed, running in oil gears; automatic, foolproof rake lifting controls; acid-proof or standard construction; quick delivery.

You will agree the NEW DENVER *High Capacity* THICKENER more adequately meets ALL requirements of today's new thickening techniques.

"The firm that makes its friends happier, healthier and wealthier"

DECO ENGINEERS — DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

DENVER EQUIPMENT CO.

1400 Seventeenth St. • Denver 17, Colorado

DENVER • NEW YORK • CHICAGO • VANCOUVER • TORONTO

MEXICO, D. F. • LONDON • JOHANNESBURG

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

November 1956

INTERNATIONAL PANORAMA

CASABLANCA, MOROCCO—The Societe Miniere de Bou Azzer et Du Graara has plans to build a cobalt refinery here to process concentrate from its mine and mill in the Atlas Mountains.

BAYINDIR, TURKEY—Radioactive fluorspar veins have been found here. The area is under military control with travel prohibited. A special department from the government's MTA will explore the deposits.

LAKELAND, FLORIDA—Kaiser Aluminum and Chemical Corporation will build a pilot plant at the Virginia-Carolina Chemical Corporation's phosphate mines to determine what minerals or chemicals can be profitably recovered from phosphate plant tailing.

MUSKOGEE, OKLAHOMA—Fansteel Metallurgical Corporation will build its new tantalum and columbium refinery here to take advantage of cheap power and natural gas.

NEW MARKET, TENNESSEE—Diamond drilling by American Zinc Company of Tennessee has indicated four major ore bodies and other small ones whose combined tonnage is greater than the total of the company's other Tennessee reserves.

ANACONDA, MONTANA—The Anaconda Company reportedly will build a $1,000,000 pilot plant to test a new process for extracting alumina from low-grade domestic clays.

ST. LOUIS, MISSOURI—Mallinckrodt Chemical Works and Climax Molybdenum Company plan a $22,000,000 uranium refinery at Henderson, Kentucky.

LONDON, ENGLAND—DeBeers Consolidated Mines, diamond sales declined by 2.3 percent in the third quarter of this year, compared with the second quarter. A shortage of diamonds, not customers, was said to be the reason.

SALT LAKE CITY, UTAH—Federal Uranium Corporation has become the operator of two uranium mining properties in Nevada, under an agreement with Constant Minerals Separation Process, Inc. of Reno, Federal will receive 50 percent of the profits, after reimbursement for funds spent in development.

LUSAKA, NORTHERN RHODESIA—American Smelting and Refining Company has taken an option on the 1,000-square miles Lunga concession from New Discovery Mining Corporation. ASARCO will explore for limonite.

ASHTABULA, OHIO—Stauffer Chemical Company will build a plant for production of titanium tetrachloride at Ashtabula. Production may begin in late 1957.

SPRUCE PINE, NORTH CAROLINA—The Chesapeake & Colorado Corporation is planning to build a 500 ton per day pegmatite plant to treat ore from the Mt. Celo and other mines. Stripping and mine development will precede mill construction.

MONTREAL, QUEBEC—Kennecott Copper Corporation has exercised its option to acquire a 51 percent interest in Molybdenum Corporation of America's rights in a columbium deposit at Oka, near Montreal.

PORT SULPHUR, LOUISIANA—Freeport Sulphur Company and Humble Oil & Refining Company will jointly mine the Grand Isle Block 18 sulphur dome which will be the first sulphur mine in the open waters of the Gulf of Mexico.

OTTAWA, CANADA—Iron ore shipments from Canadian mines in August rose about 1,000,000 tons over August of last year—3,720,055 tons compared with 2,675,718 tons in August of 1955.

TOKYO, JAPAN—Showa Denko Company plans to increase its aluminum production capacity by 50 percent to 30,000 tons annually by 1958. Plans call for installation of a new electrolytic cell at the company's refinery at Kitakata.

PITTSBURGH, PENNSYLVANIA—Jones & Laughlin Steel Corporation has leased a large iron ore deposit in Ontario, Canada from Dominion Gulf Company, a subsidiary of Gulf Oil Corporation.

Anaconda To Recover Alumina from Clay

The Anaconda Company reports that, after nearly two years of laboratory and test plant work, it has solved the problem of producing alumina from clay located in the area of Moscow, Idaho. A $1,000,000 pilot plant will be constructed to work out development of a full-scale commercial operation with adequate capacity for furnishing the company's total requirements for alumina on an economically competitive basis.

The company has already optioned vast reserves of clay in the Moscow area, which are approximately 375 miles by railroad from the firm's Montana aluminum plant. It is expected that when it is constructed, the commercial plant will be located at the site of the clay deposits.

Stauffer To Build Plant At Ashtabula, Ohio

Stauffer Chemical Company will build a major plant to produce titanium tetrachloride at Ashtabula, Ohio. The new facility will supply the titanium tetrachloride needs of the titanium sponge plant which National Distillers Corporation plans for the same area. The latter is reported to have a capacity of 5,000 tons of titanium sponge per annum. (See Mining World, June 1956, page 75.)

The new Stauffer installation, which will utilize a number of process improvements resulting from the company's research in metallic chlorides, is in addition to the titanium tetrachloride expansions Stauffer has under way at Niagara Falls, New York. Capacity at that operation is currently being doubled.

It is anticipated that the Ashtabula unit will go into production late in 1957.

Jones & Laughlin Leases Canada Taconite Deposit

A large iron ore deposit, about six miles from Kirkland Lake in Ontario, Canada, has been leased by Jones & Laughlin Steel Corporation from Dominion Gulf Company, a subsidiary of Gulf Oil Corporation. J & L has drilled extensively, since optioning the property in April 1954, to determine the extent of magnetic taconite reserves. During laboratory testing of ore samples the company developed an economic process for concentrating the taconite. Mining operations and a beneficiation plant are planned, but details have not been released.

Jones & Laughlin also optioned a large iron ore deposit in Quebec early this year from Quebec Cobalt and Exploration Ltd. (see MINING WORLD, April 1956, page 59).

In December—Anaconda's Underground Expansion at Butte

INDEX MAP showing the location of the Goodnews Bay mining operations in Western Alaska. Nearness to the sea simplifies the freighting operations of the company.

THE BUCYRUS-ERIE WALKING DRAGLINE helps in the stripping operations at Goodnews Bay, and also digs gravel in areas inaccessible to the dredging operations.

Goodnews Bay Continues to Rank as

By HENRY G. GRUNDSTEDT

Manager Engineering Services

The operations of the United States' major platinum producer, Goodnews Bay Mining Company, although not drastically changed since its inception, has kept pace with mining problems through the years; today it is the largest platinum producer under the American flag. Goodnews Bay Mining Company produces over 90 percent of all American platinum. Since 1935, when the firm was organized, the operation has continued to grow, show a profit, and through effective management has been able to keep abreast of many tough mining problems.

Primarily a dredging operation, with draglines working intermittently, the Goodnews Bay Mining Company works placer ground near Platinum, Alaska. Dredge location is on Salmon River near the mouth of the Kuskokwin River. A Yuba, connected bucket-line dredge with 8-cubic-foot buckets, Bucyrus-Erie 1⅛- and 1¼-cubic-yard draglines, several Caterpillar dozers, and a bedrock sluice with hydraulic monitors comprise the bulk of the placering equipment. This equipment enables the company to dig approximately 1,200,000 yards of material in an average season of about 200 days. In addition a 200W Bucyrus-Erie walking dragline with a 6-cubic-yard bucket handles about 600,000 cubic yards of material in a stripping program.

An enlarged power plant, centralized dredge lubrication system, and modified recovery equipment have enabled the company to continue to operate profitably and efficiently.

Exploration Work

An expensive exploration program is carried on concurrently with placering operations. This work is done both to delimit the paying gravel and to calculate future reserves. Exploration drilling is done with Bucyrus-Armstrong 6-inch placer churn drills, and a Failing rotary drill for attempted core recovery. Drilling is done on a regular grid pattern, with holes spaced between 50 to 100 feet apart on lines 500 or 1,000 feet apart. In many instances, it is desirable to recover a core in order to approximate the actual mineral content of the gravel to be worked. As can be well imagined, recovering a core in soft ground is no simple matter. The method to recover core, developed by the engineering staff of the Goodnews Bay Company, is quite interesting. Using the Failing drill for rapid drilling, a 6-inch hole is drilled down to the pay gravel. The operators usually attempt to core the last 20 feet of the hole in the pay gravel. When the hole reaches the ground to be cored, a 6-inch casing is driven to the bottom of the hole with the churn drill. At this point a 5-inch core barrel equipped with a coring bit is lowered through the casing, and driven beyond the bottom of the casing. Core is then extracted from the core barrel, and the casing again driven further. The whole process is repeated again, until the desired depth with the corresponding core is attained.

To recover cores in soft shallow ground, the casing alone is driven with a churn drill, and a core extracted from the casing. By recovering cores in this manner, the company has found the calculated value of the mineral content of the gravel has agreed quite closely with the actual mining results. Therefore, extremely accurate predictions are being made as to the value of the gravel lying ahead of the dredge.

Power Installations

All power at Goodnews Bay is derived from Diesel-electric units housed in a power house on shore. Previously the power plant was housed on the dredge, but due to increased power requirements, the increased weight of the plant forced the operators to move it to shore. Presently, power plant equipment consists of two 720-horse-

PLATINUM NUGGETS pictured above are worth over $1500. The center nugget is approximately 2 inches wide.

THIS 8-CUBIC FOOT, 92 BUCKET YUBA DREDGE is capable of digging 50 feet below the pond. The dredge frequently has to do this, as the depth of the pay gravel varies from 15 to 60 feet. In a season the dredge digs about 1,000,000 cubic yards.

America's Leading Platinum Supplier

power McIntosh-Seymour Diesels with Westinghouse generators producing 625 kva, a 1,440-horsepower Enterprise Diesel with a 1,250-kva Elliot generator, and for auxiliary power a 500-horsepower General Motors Diesel with a 312-kva Westinghouse generator. Power is distributed through ⅝-inch wire reinforced aluminum transmission lines to the dredges camp, shops, etc. Dredge power from shore to dredge is supplied with a 3-conductor portable cable known as a "bologna cable". Output from the generators is at 2,400 volts; however, due to line loss, this will presently be boosted to 4,160 volts. Transformers on the dredge step down the power to 440 volts. Overall power cost is now less than 4.0 cents per kwh.

Placering Operations

Early spring finds the camp once again in preparation for another mining season. Maintenance work on all equipment started April 3. This work continued until April 29th, and during this time equipment was checked and overhauled to eliminate possible breakdowns during the mining season. In late April ice is removed from the dredge pond and the dredge is ready for operation.

Pond ice is usually three feet thick, and is cut into blocks three feet wide and 10 to 12 feet long with a Titan chain saw. Cutting with the chain saw is done with a seven-foot cutter bar and a modified chain. Chains attached to the dragline buckets are wrapped around the blocks and the ice hoisted away and dropped on shore alongside the pond.

Although the amount of permafrost found at the Goodnews operations is negligible, early in the season finds approximately six feet of surface frost. While the dredge is able to dig through this; yardage is increased and bucket wear reduced by blasting. The occasional lenses of permafrost the dredge encounters are no problem as they are not too large.

The 8-cubic-foot, 92-bucket, Yuba dredge is capable of digging 50 feet below the pond water level, and frequently does this, as the mining thickness of the gravel varies from 15 to 60 feet. Actual thickness of the pay gravel lying on a bedrock of altered dunite, serpentine, and some hard sedimentary rock ranges from two to six feet. The decomposed bedrock consists of a tough, clay-like material which quite often contains platinum, and poses a tough recovery problem in freeing this mineral. The dredge usually digs from one to six feet into the bedrock, not only to recover all the platinum, but also because of the irregular topography of the bedrock. A panner, or sampler is stationed on the dredge to take samples in the dredge buckets of the bedrock material. This method enables the dredge operators to know accurately when they have reached the bottom of the pay zone.

Occasionally the dredge is forced to dig through non-mineral-bearing material. Until recently this barren material had to go through the complete washing cycle, before it was finally discharged by the stacker. Recently a method was developed whereby movement of this waste material through the dredge was accelerated by reversing the action of the trommel screen, thus forming a screw conveyor action, and rapidly passing through this material.

The pontoon-type dredge, along with the walking dragline work 24 hours per day, every day, throughout the season. During this time the dredge digs approximately 1,000,000 cubic yards.

Dragline Operation Flexible

An additional 200,000 cubic yards of gravel handled during a 150-day season by two smaller draglines augments the dredging operation. Actually this is a rather flexible operation for working ground inaccessible for dredging. The small draglines—a Bucyrus-Erie 37-B with a 1¾-cubic-yard bucket and a Bucyrus-Erie 37-B with a 1⅝-cubic-yard bucket—are used in connection with Caterpillar bulldozers. The area to be mined is first stripped of moss and overburden

MODERN FACILITIES at the Goodnews camp make living quite pleasant in this remote region of Alaska. The camp houses approximately 100 people during the operating season. If you look closely, you can see the dredge in the background.

by the draglines, sometimes alone and sometimes with the help of the bulldozers. The dragline then digs a bedrock drain for the sluice box. After the sluice box is installed, the gravel is fed in by the bulldozers and the draglines stack tailing at the end of the sluice box.

Three significant improvements over earlier recovery methods have been made recently on the Goodnews Bay dredge:

1. Lengthening of screen through use of patented Olson section.
2. Installation of a scrubber section in trommel screen.
3. Installation of a "Mud Hog" pulverizer.

PICTURED ABOVE are part of the management team at Goodnews Bay. Looking from left to right are: G. P. Conner, accountant, L. F. Barber, mine engineer, and Ed Olson, vice president and general manager of the Goodnews Bay Mining Company.

As the volume of material being handled by the dredge was being increased, it was found that the 36½-foot-long trommel screen, with a diameter of 7½ feet, could not handle this additional material and still do a good screening job. To increase the capacity of the screen, Ed Olson, vice president and general manager of Goodnews Bay Mining Company, developed the Olson section. The design of this section provides additional screening area over the screen section normally blanked out by the lower tread ring and end plates.

More Problems

Additional problems arose through the increase in clayey material being handled by the dredge. It was found that a considerable amount of platinum was being lost because it was locked up in varying sizes of clay balls which could not be broken up in the washing process. To overcome this problem a scrubber section was placed at the head of the trommel, and a Mud Hog pulverizer installed on the lower floor of the dredge.

As the material enters the trommel screen at the head of the circuit, it passes through the scrubber section,

which is actually a series of baffles to retard the flow of material. At the same time high-pressure water jets are sprayed on the material, resulting in the breaking up of the clay balls and the subsequent formation of a slurry. The last five feet of the screen contain 2½-inch perforations which allow the undersize material to pass through the screen and down a chute to a stacker belt. This, in turn, discharges the undersize off the dredge. The oversize material passes into a stacker hopper chute, and can go either to the stacker belt or be directed by a diversion gate onto another conveyor which dumps the material into the Mud Hog.

Mud Hog

The Mud Hog is a Jeffery type B-3 hammer mill pulverizer with a traveling breaker plate. The 42- by 36-inch Mud Hog is powered by a Westinghouse 125-hp motor. With the discharge set at 1¼ to 2 inches, the clay balls are pulverized to a slurry which a sand pump can handle. The Mud Hog discharge drops into a sump, where it is picked up by a Yuba model "S", 10-inch sand pump. This pump, with a capacity of 2,400 gpm, and pumping against a 50 foot head, pumps the slurry to the head of the trommel screen again. Present speed of the Mud Hog is set at 1,050 rpm; however, company engineers feel a better breaking action may be realized at 1,200 rpm. This will be changed shortly.

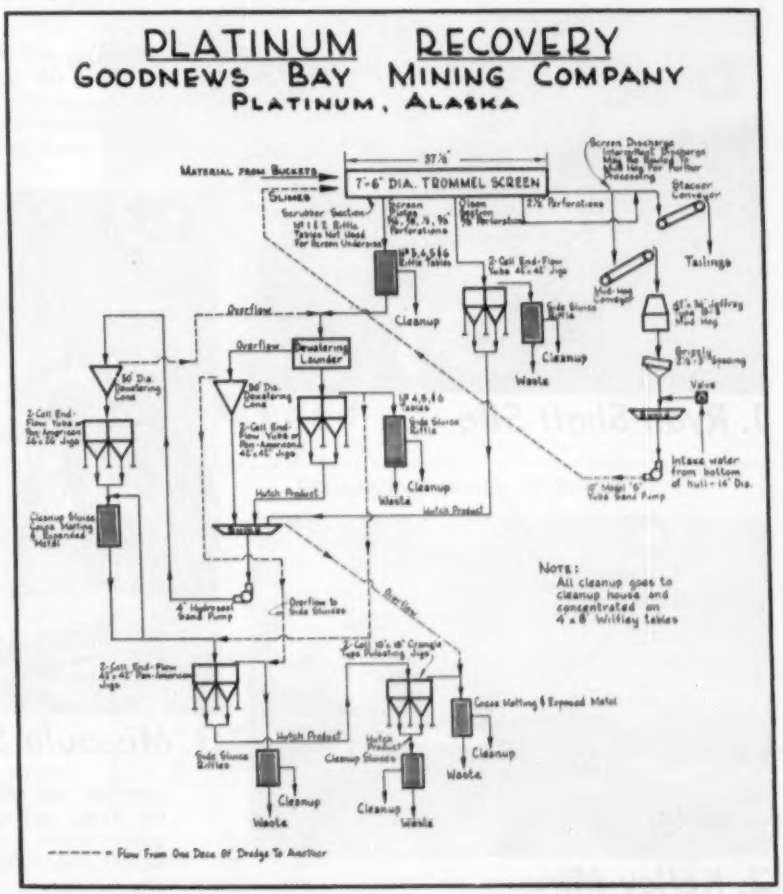
Undersize material which is almost completely slimed, passing through the trommel screen's range of perforations, from ⅜ to ⅝ inches, flows on to a bank of rubber riffle tables. The majority of the platinum concentrates are recovered from these tables. Table overflow in turn flows into a series of Yuba and Pan American jigs. Jigs recover the balance of the platinum concentrates. Concentrate from the 42- by 42-inch rougher jigs, after dewatering, are pumped by a 4-inch Hydroseal sand pump into 26- by 26-inch cleanup jigs. The cleanup jigs' hutch product is collected on an expanded metal and cocoa matting cleanup sluice. Overflow from this cleanup sluice flows to a pair of 42- by 42-inch end-flow Pan American jigs. Hutch product from these jigs goes on to another pair of 18- by 18-inch Crangle type pulsator jigs, while the overflow passes onto more sluice riffles, at which point a cleanup is made. The hutch product from the Crangle type jigs travels to a 20-foot long, by 24-inch wide expanded metal and cocoa matting cleanup sluice, while the jig overflow, flows on to tailings sluices and on out the boat. Cleanup at the tailings sluices occurs approximately every three weeks.

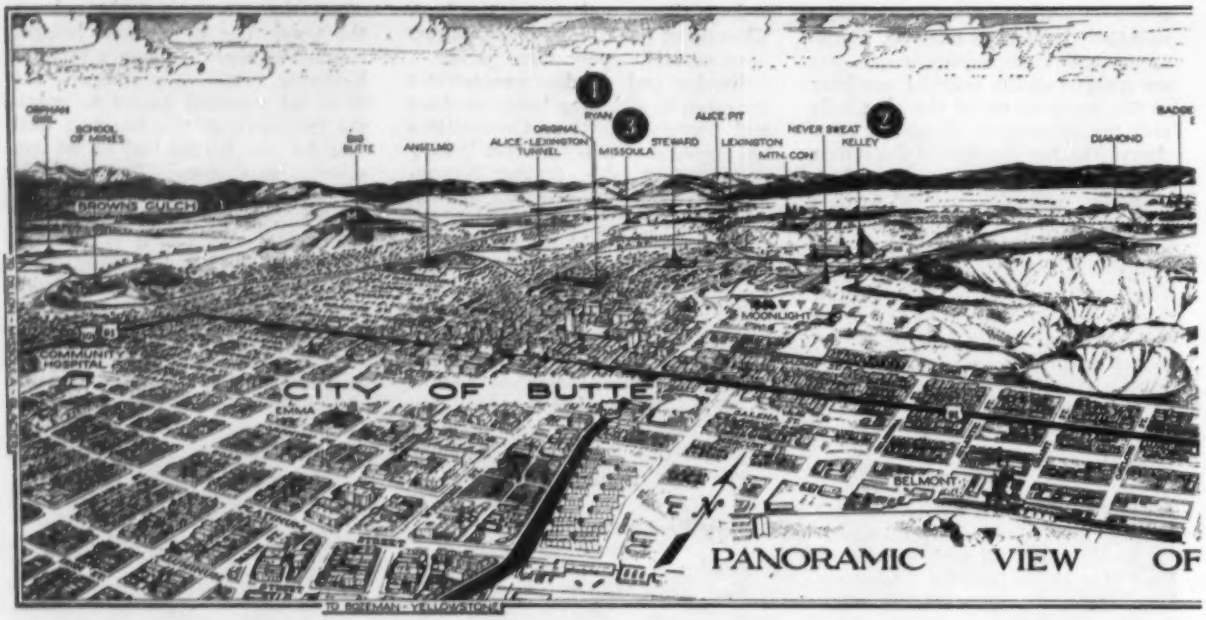
Dredge and dragline concentrates are taken to a cleanup house on shore and processed further. Concentrates are passed over a 4- by 8-foot Wilfley concentrating table. Further concentration is effected by drying, screening, magnetic separation, and blowing. Forced air is blown up through the concentrates which are placed in an agitating hopper. The platinum, with a high specific gravity, falls through the air into a sectionalized box, while the lighter impurities are blown away into a different section of the box. This final method of cleanup has proved so effective that over a 90 percent concentrate of platinum metals and gold is achieved.

Supply Problems

Besides the normal problems of mining and milling inherent with such a large placer operation, the company also has to attend to sizable maritime problems. The town of Platinum, on the coast of the Bering Sea, which is the Goodnews district supply depot, is situated so that ocean-going freighters cannot approach closer than seven or eight miles to the town. The problem of bringing supplies to shore involves a full-scale lightering system. The company uses three self-powered barges to unload the freighters at sea. Mooring facilities for the barges had to be constructed so that unloading could be accomplished in all types of weather. From the docks the freight is hauled another 11 miles inland to the mine camp. A small marine ways was also built to haul out the lightering equipment for overhaul and maintenance. Needless-to-say, there are no other marine repair facilities close by in this isolated region. A considerable capital investment is tied up in these installations, considering only two supply freighters per year arrive at Goodnews Bay.

It is fortunate the Goodnews Bay Mining Company is guided by a top-notch group of management and operating people, who have solved many of the tough problems which have come up, to keep this large operation on such a profitable basis. Although the property is good, good property can provide just marginal returns with poor management. Goodnews certainly does not produce just marginal returns.





Anaconda Maps Greatest Expansion

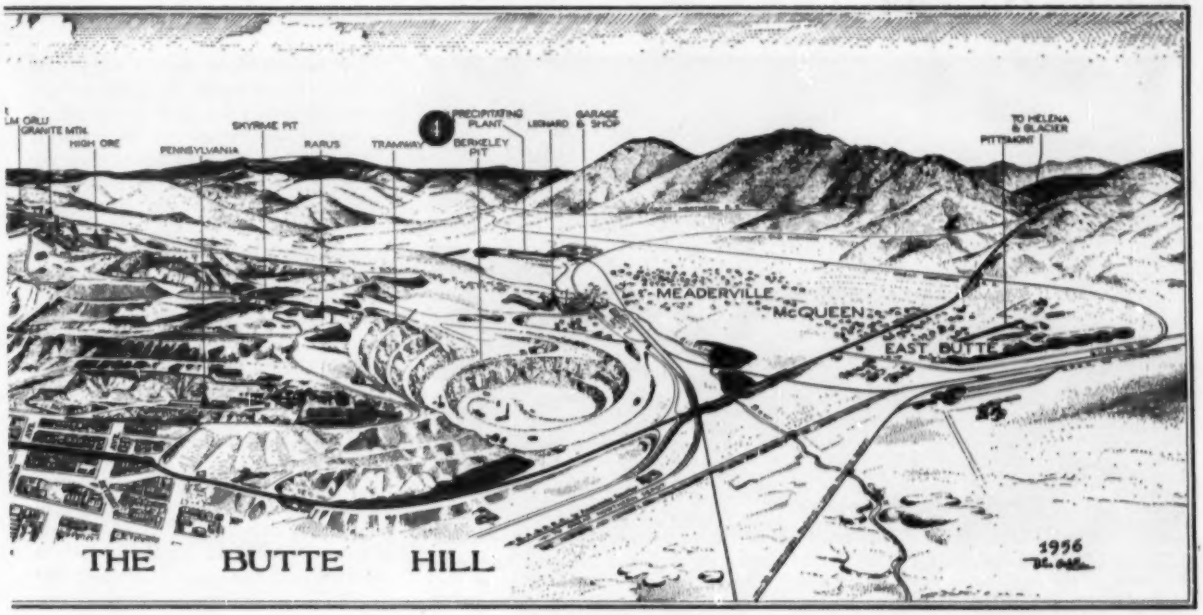
1. Ryan Shaft Site

2. Kelley Mine

Mining at Butte, Montana now stands on the threshold of one of the greatest expansions in the 92-year history of the district. The Anaconda Company has programmed two new projects to increase mine production from the richest hill on earth by 32,500 tons daily. The first and closest to full production is the Berkeley open pit where preliminary stripping is being done by the F & S Contracting Company. By mid-1957 another 17,500 daily tons of 0.8 percent copper ore will be shipped to the concentrator, located 30 miles away at Anaconda, Montana, from the developing Berkeley open pit. This operation marks the first entry of The Anaconda Company into large scale open pit mining at the Butte camp, long famous for underground production of copper, zinc, manganese, and silver ores.

3. Missoula Shaft

The second major project which is just getting underway is the Northwest project which will be an underground operation and will involve sinking of two new shafts—one, the Ryan, will be a concreted shaft with four skipways similar to the 35-foot 4-inch by 6-foot 9-inch Kelley. The second shaft is the Missoula which will service the project. The two new shafts will (1) permit the development of

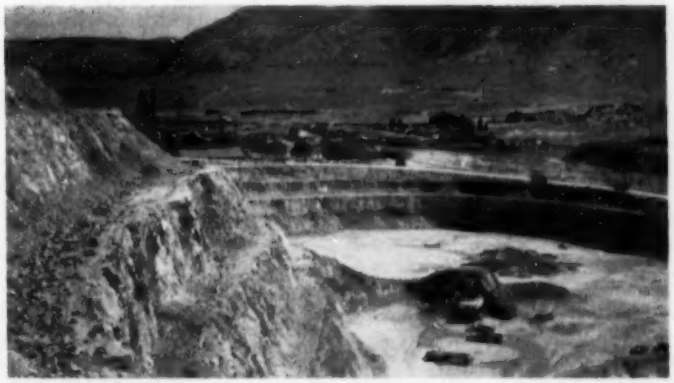


Program in the History of Butte

copper-zinc veins known to exist in a large area north of the Anselmo and west of the Lexington and Mountain Con mines which have been virtually untouched by past mining activities; (2) provide greatly expanded ore hoisting facilities for hard-pressed shafts in other producing areas near the Northwest part of the district; these shafts and surface plants were never engineered to handle the present increased rock production requirements at depths of 4,000 feet or more; (3) tie large areas containing low-grade copper and low-grade zinc to a high capacity hoisting facility by means of modern, 36-inch gauge, tracked, haulageways; and (4) ultimately add another 15,000 tons of copper-zinc ore to the daily total now produced by Anaconda from Butte mines. The Northwest project will probably expand by stages with initial production of 7,500 tons daily being reached in 1961.

In addition, two other highly interesting projects are under investigation and, if they prove feasible, development of each will add large tonnages of ore to the Butte production record. One is known as the East project which centers in the alluvial covered valley southeast of the Berkeley open pit and west of the East Ridge or Continental Divide. This would involve underground development and possibly another major ore hoisting facility similar to the Kelley and the planned Ryan shaft. Still another is the Continental Project, and it is here that a second big open pit might be developed if metallurgical tests indicate that the ore can be treated with satisfactory recovery of copper.

For details of the Berkeley open pit see the following pages.



4. Berkeley Pit

PRODUCING MINES AT BUTTE

Zinc	Copper	Manganese
Anselmo	Kelley	Emma
Lexington	Mountain Con	
Badger	Belmont	
	Original	
	Leonard	
	Steward	

Typical Shipment of Ores during a Six-Day Week from Butte Mines (August 1956)

Copper ore from vein mining	30,000 tons
Low-grade copper ore from block caving (Kelley)	90,000 tons
Low-grade copper ore from open pit (Berkeley)	33,000 tons
Manganese ore	9,000 tons
Zinc ore	21,000 tons
Total	183,000 tons

Projected Daily Capacity of:	
Berkeley low-grade copper ore	17,500 tons
Northwest project copper and zinc ores (ultimate)	15,000 tons

Berkeley Open Pit

SECONDARILY ENRICHED COPPER ORE will be developed by The Anaconda Company in the first major open pit in the Northwest. The mine is located at the southeastern edge of the famed Butte hill. Headframe of the Rarus mine is at top right.

In the Northwest, attention is focused on Butte, Montana where The Anaconda Company is rapidly readying the Berkeley open pit for full-scale production of 17,500 tons of low-grade copper ore per day. This project will add another 65,000,000 pounds of copper annually to Butte's underground output and will mean an expenditure of $7,000,000 for equipment purchase alone. The Berkeley will also be the first sizeable open pit ever developed in the northwestern part of the United States, and represents a radical departure from traditional underground mining which has been underway for years at Butte.

Stripping of the deposit actually began in March 1955 when a small test pit in the southeastern part of the ore body was opened. Limited production of ore has been underway since the first of this year. The mining schedule has been established to reach a 10,000-ton-per-day goal by the end of this year, and 17,500 tons by mid-1957. At the present time, 60,000 tons of rock is being handled per day at the Berkeley of which 5,500 tons is ore. F & S Contracting Company is doing the stripping under contract. Anaconda will handle the mining operation, however.

Among some of the outstanding features of the developing mine are:

- The use of fertilizer grade ammonium nitrate mixed with carbon for blasting purposes.
- Outstanding shovel performance with over 8,000 tons per shovel shift being obtained with 6-yard machines.
- Rotary drill footages which have averaged 650 feet per machine shift over a month's time.
- An exceptionally close check between the grade of ore shipped to date and grade indicated by churn drill exploration.

Rotary drilling, electric and Diesel shovels, and modern truck haulage have become every day fixtures at Butte and are changing the familiar features of the hill.

Ore Indication Noted

The Berkeley open pit is the normal outgrowth of work which started during the preparation of the Greater Butte block caving project. At that time Anaconda's geological department found indications of a secondary enriched zone of low-grade copper ore southeast of the Kelley mine. Several long exploration crosscuts were driven to give some indication of extent and probable grade of the mineralization. The preliminary work with these exploration headings proved quite encouraging and the company decided to undertake a more complete sampling program by churn drilling.

The actual drilling was contracted to the Lyons Drilling Company of Salt Lake City, Utah, but Anaconda assigned a man from its own organization to handle sampling activities at each drill rig. The holes were put down on 200-foot centers on a grid which was oriented in a northwest-southeast and northeast-southwest direction. The information obtained by churn drilling was combined with the detailed maps, records and geologic data which Anaconda has so carefully built up through the years. In places underground mining of higher grade sulphide veins had been carried out at elevations below the secondarily enriched copper zone now being developed, so a great deal of information regarding rock structure and mineral characteristics was known.

100,000,000-Ton Reserve

Churn drilling disclosed a large secondarily enriched zone consisting predominantly of sooty chalcocite mineralization which occurred beneath a relatively shallow cover averaging 250 feet thick. In this particular area copper minerals occurred in numerous small veinlets as well as being disseminated through altered granite. Berkeley reserves now total in excess of 100,000,000 tons of 0.8 percent ore, sufficient for more than 20 years operation at 17,500 tons per day. Overburden, plus included waste, amounts to some 190,000,000 tons.

As drilling progressed a small experimental pit was started in 1955 near the southeastern corner of the deposit to furnish ore for mill and smelter test work. By the end of 1955, ore was being mined at a daily rate of 3,000 tons.

Accurate Reserve Totals

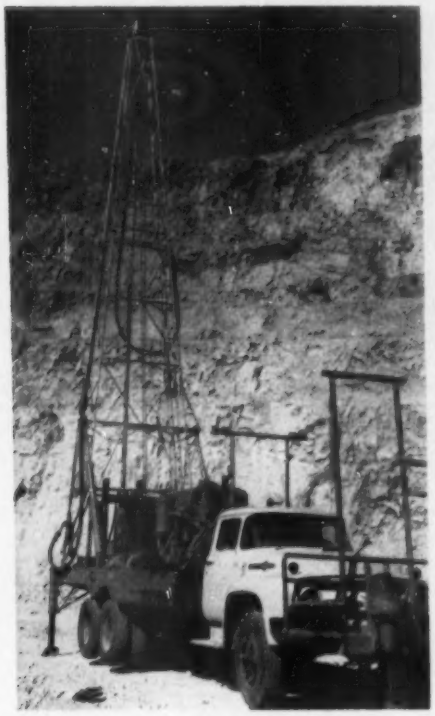
One of the most significant results to date is the remarkably close correlation between churn drill results and the actual record of ore shipments to date. Near the end of June of this year a total of 719,000 tons of ore had been mined and shipped from four different benches during the year. Churn drill data had indicated a copper content of 1.01 percent. Actual shipments to the concentrator at Anaconda, Montana assayed 0.98 percent copper. This performance is a good testimonial to the care taken in sampling as well as the accuracy of adjustment factors which entered into ore reserve calculations.

Maximum 7 Percent Grade

When stripping is completed, the pit perimeter will measure 4,600 feet by 2,600 feet at the top. At present the pit measures 1,400 by 1,100 feet. The deepest point will be 1,086 feet below the surface. The shallowest

---

STANLEY DAYTON, associate editor, prepared this report on Anaconda's open pit mining at Butte. His second article on underground mining expansion in the "Richest Hill on Earth" will be in the December issue of MINING WORLD.



6¾-INCH BLAST HOLES are drilled in ore with this truck-mounted rotary rig. As a rule, the holes are spaced on 22-foot centers.

LOADING WASTE on one of the upper benches of the open pit is a 6-yard electric shovel. The truck is one of a fleet of tandem, rear axle units hauling 34-ton loads. Benches in waste are 50 feet high; in ore, height is 25 feet.

TEMPORARY INSTALLATION composed of 48- by 42-inch jaw crusher will be replaced later with an underground crusher within the pit limits. An inclined conveyor tunnel will deliver crushed ore back to surface facilities.

ROTARY DRILLS handle all blast hole work. The unit pictured above puts down 9-inch holes and averages 650 feet per machine shift.

DIESEL POWERED SHOVEL with 3⅜-yard bucket is used on lower benches which are now in ore. Truck shown above hauls a 28-ton payload, and at the present time about 5,500 tons of low grade copper ore is produced at the Berkeley each day.

point will be near the Meaderville highway where the pit will bottom at 500 feet below the surface. Slope on the pit will ultimately be 45° and maximum haulage grades on roads connecting benches will be 7 percent. Outside the pit a 4 percent grade is used. The latter grade was planned so that year-round operations could be carried on uninterrupted during winter months. Butte isn't located in a heavy snow belt but sub-zero winter temperatures are fairly common and snowfalls usually stay on the ground until the spring run off. The Berkeley open pit should contribute valuable information regarding cold weather operations. For instance it may be necessary to put some kind of all-weather surfacing material on pit haulageways to protect roads and prevent formation of deep ruts during the spring run-off.

Bench Height

Bench heights are maintained at 25 feet in ore and 50 feet in waste. However, a trial will be made in waste benches by dividing each 100-foot elevation into 3 benches at 33⅓-foot interval.

Several different thoughts enter into the establishment of the present ore bench interval. Of utmost importance is the fact that a few horses of waste exist in the area outlined for open pitting. The erratic nature of portions of the ore body means that a degree of selective mining must be practiced on the benches. It is obviously easier to separate ore and waste with a minimum amount of dilution or loss if a low bench height is used. Better control of selective mining will result.

Digging Vs. Breaking Cost

F & S Contracting Company also favors low benches—in fact, one low enough so that the shovel bucket will clear the top of the bench. They feel that it is more important for the shovel operator to be able to control and dig away at shattered rock at or near the top of a bench which refuses to slough away as muck as the bottom is cleaned up and removed. The better control of digging action along the entire bench face removes the hazard of a sudden slough from near the top of a bench and out of reach of the shovel dipper. Also there is some reduction in the amount of secondary breaking required in order to reclaim shattered hang-ups near the top of the face. These advantages, according to F & S, outweigh any possible reduction in powder and drilling costs which would be obtained if a larger interval were to be used between benches.

Another reason cited for the low bench interval is that benches of 33 feet or less match the rotary drills. The mast on two of the larger machines just nicely fits a 33-foot bench, and a blast hole can be collared and drilled to the required 5 to 7 feet below grade without adding additional lengths of steel. Higher benches would mean that an additional length of steel would necessarily have to be added thereby cutting down on drill time.

For blast hole work at the Berkeley, F & S has two medium-size rotary drills capable of exerting 50,000 pounds pressure on the bit. These rigs are mounted on crawlers. They contain their own power plant and hydraulic leveling jacks, and are equipped with a mast which provides a ground to sheave height of 47 feet 8 inches. Drill cuttings are removed by air blast. A third unit is also employed which is a truck mounted rig that is normally used in ore since it is smaller and more mobile. It has a 40-foot mast plus a hydraulically operated, automatic chuck. The larger rotary drills utilize 9-inch diameter Tricone bits and the truck mounted rotary a 6¾-inch bit.

Hole spacing varies somewhat with the rock, but a fair average would be 22 feet with a 26-foot burden on the toe of the hole. This holds true for both the 9 and 6-inch holes. Actual drill footage over a month's time will average 650 feet of hole per drill shift. Rate of penetration is even greater than this figure but normal delays and waiting periods, time for moving, etc., reduce the footage to the above figure. Life of the 9-inch bit is 4,000 to 6,000 feet. The smaller 6¾-inch bits used with the truck mounted rig generally have a life expectancy 1,000 feet less than the larger bits.

Fertilizer Grade Powder

The powder used in the blast holes is fertilizer grade ammonium nitrate mixed with carbon. This low velocity powder has given excellent results at Butte and supervisors are quite happy with it. Each 9-inch hole is loaded with approximately 312 pounds of powder. One hundred pounds of the slow acting nitrate gives a 3-foot rise in a 9-inch hole. The holes are primed at the middle of the powder column with a 12½-pound charge of 60 percent dynamite and fired with electric delays. Each hole is stemmed to the collar. The powder column in the 9-inch hole is about 10 feet and in the 6-inch hole about 11 feet. Priming the charge in the middle of the powder column is an added safety factor and increases the chances for positive detonation since the entire shock of the primer is propagated against the charge in all directions.

Loading and Haulage

Loading of broken waste is done on benches by three, electrically operated, 6-yard shovels with a maximum cutting height of 36 to 37 feet. These

machines can dig to 9 to 10 feet below grade if required. A smaller, 3½-yard, Diesel-driven shovel is used for the bottom benches which are in ore. The 6-yard shovels and the entire open pit team have done an outstanding job of compiling an enviable record of over 8,000 tons loaded per shovel shift. In May the average was 8,289 tons per shovel shift. This figure for the year to date is 8,025 tons. Shovels work normal to the bench face so that trucks can be loaded on both sides of the shovel and the necessary swing is reduced; no time is lost while spotting an empty truck in position.

Haulage is handled by a fleet of 38 trucks made up of tandem, rear-axle models which have a 24-yard struck capacity and are loaded with 34-ton payloads, and single, rear-axle trucks with a 15-yard struck capacity which handle 28 ton payloads. Both models are equipped with torque convertor drives for smooth transmission of power to drive wheels. Normally, seven trucks work with each electric shovel.

SUPERVISING ACTIVITIES at the Berkeley are George Parker, pointing to map of drill holes, and John Dougherty at the right. Mr. Parker is pit superintendent and Mr. Dougherty is pit engineer. Both worked at Chuquicamata, Chile.

Waste Disposal

Waste is disposed of in three separate locations within an area north of the open pit. As operations progress, one master disposal area will build up with 5 and 7 percent access roads leading to the dump from the pit. One small area which takes advantage of the topography for natural drainage has been earmarked for leaching of sub-grade oxide material; water has already been introduced to this dump. The solution which percolated through the rock is sent to the precipitation plant at Meaderville which was established some years ago to recover copper from waters pumped out of the Butte mines.

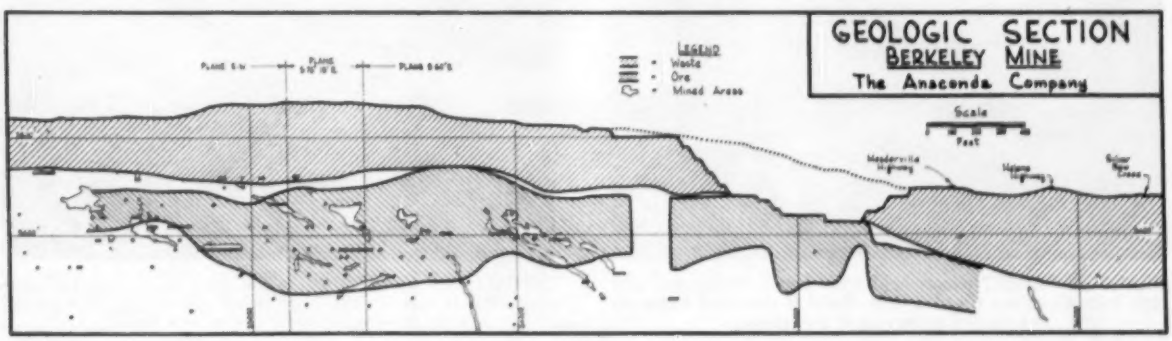
Ore is trucked to a temporary crushing installation located near the Meaderville highway. A 48- by 42-inch jaw crusher reduces the 5,500 tons of ore daily to 6-inch size. A short conveyor tunnel has been excavated beneath the Meaderville highway and daylights over a railroad siding. Each truck load of ore is crushed as it is dumped and conveyed to a railroad car spotted below the belt. Empty cars are moved under the conveyor by an electric winch.

Plans for permanent crushing facilities for the open pit have been finalized. Briefly two crusher locations within the confines of the pit perimeter have been selected, and ore will be delivered by belt conveyor either to a 30,000-ton surge storage pile or directly to a 7,500-ton bin to be constructed near a railroad facility south of the surface workings. A crusher will first be installed near the edge of the pit, but an elevation of 5,600 feet which is below the surface. A permanent raise will connect this crusher with a concreted, inclined conveyor tunnel which will hole the surface beyond the open pit. The storage point will be about 900 feet from the crusher.

When open-pit operations have progressed to deeper benches, the inclined conveyor tunnel will be extended to a position below the bottom of the pit. The crusher will then be moved to the lower location. This arrangement will provide an average level haul for trucks in disposing of ore. Truck hauls will be shortened and the method provides for low-cost handling of ore from the bottom of the pit.

Engineering Control

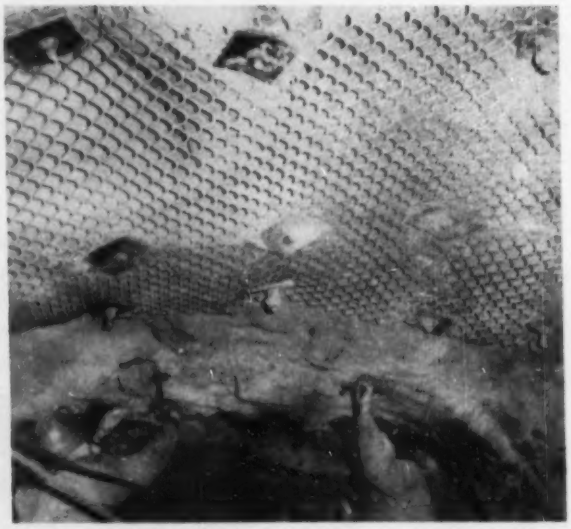
An interesting shop-made level has been developed through the combined efforts of several of the members of the mining engineering department to help control the grade of the benches at the mine. It consists of a 3-foot length of 2-inch pipe with a piano wire cross hair at one end and a peep hole at the opposite end. On top of this tube a plexiglass, level bubble attachment has been mounted and the whole unit is installed on a tripod made in the carpenter shop. The level is quite rugged and several of them remain permanently on various benches near shovel operations so that operators or helpers can check grades periodically from control points established by engineers. Incidentally routine mapping of excavation and bench development is done with alidade and planing table from transit control points. These ideas have saved many man hours and are indicative of how well the various departments of The Anaconda Company at Butte have taken to open pitting.



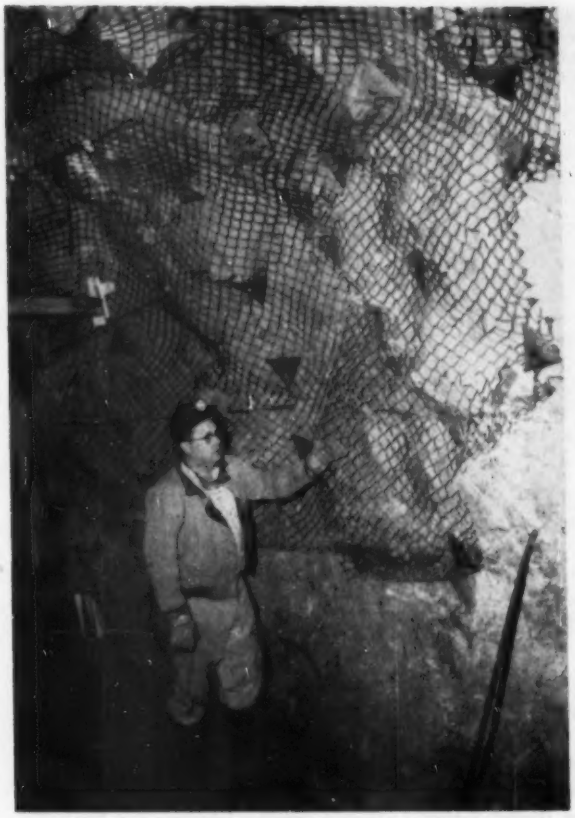
LOOSE ROCK has been caught and held by this Realock fabric in badly fractured ground. Fabric is held in place with 1-inch wedge and slot type rock bolts. This is a permanent installation so galvanized fabric has been used. The panels have been placed across the back of the opening and perpendicular to its axis. Note earlier support attempts with pierced steel

How Western Mines Use Metallic Fabric

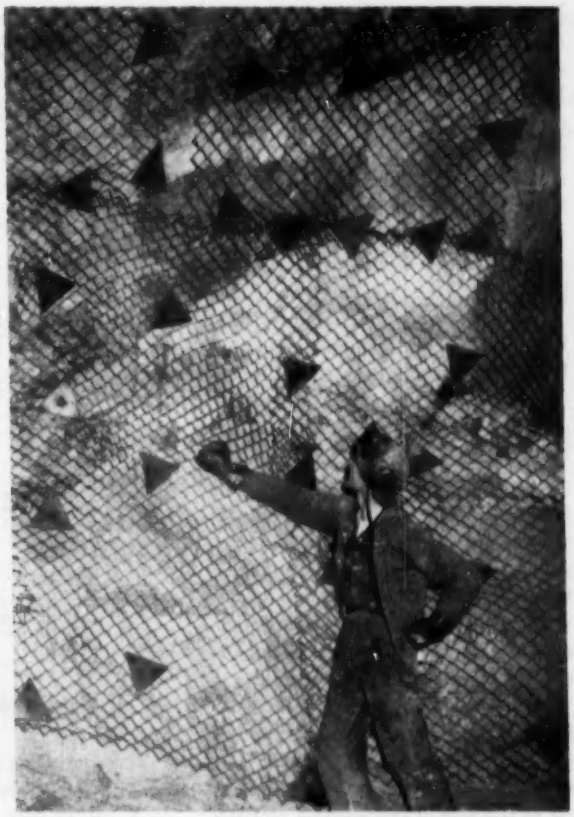
REALOCK FABRIC panels held with 1-inch wedge and slot rock bolts along the rib of a drift. Panel is stretched along rib and parallel to the axis of the opening.



INSTALLING FABRIC across the back of a drift and perpendicular to axis of drift. Note smooth contour of back permit tight drawing of fabric against rock surface.



TEMPORARY SUPPORT until drift is concreted using fabric and ¾-inch expansion bolts. Bolts have left hand thread for machine tightening. Fabric use cuts drifting time 30 percent.

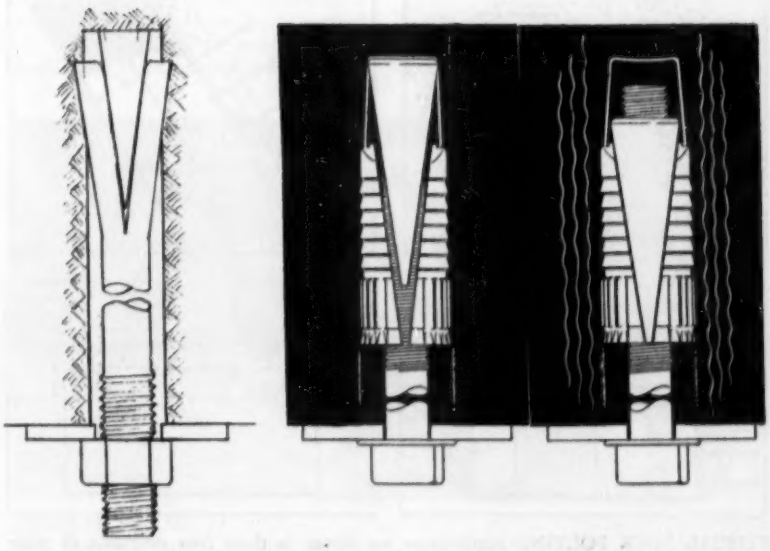


PULL FABRIC around sharp corners tight against rock with ¾-inch expansion shell bolts. Triangular shaped dished washers fit irregular ground best with overlapping fabric panels.

Lagging For Support Between Roof Bolts

By H. K. SCHMUCK

One problem in using rock bolts in western metal mines has been to find a satisfactory material for lagging between the bolts to hold the small pieces of rock which in spally or blocky ground will fall out of the back or walls even though the rock bolts will keep the opening from caving. Several of the largest underground metal mines in the west are now using CF&I Realock chain link fabric, both galvanized and ungalvanized, for this purpose. The Realock fabric is flexible and so can be drawn tightly against the rock regardless of its contour or irregularities. While flexible, it is very strong, and, like chain mail, it will give rather than



ROCK BOLT TYPES are 1-inch wedge and slot (left) and ¾-inch expansion shell.

Mr. Schmuck is product engineer for the mining supplies division of the Colorado Fuel and Iron Corporation with headquarters in Denver, Colorado.

break upon impact. One of its main advantages is ease of handling and of separating panels into whatever length is desired. In making panels, all that has to be done is to untwist the selvage of any wire at both edges and wind or unscrew it out of the fabric. In like manner, additional fabric may be added to any length already installed by reversing this procedure.

To date, the most commonly used Realock fabric for metallic lagging has been 60 inches wide with a 2-inch, diamond-shaped opening of No. 9 gauge wire with knuckled selvages on both edges and in the "black" or ungalvanized condition. Other widths from 36 to 84 inches are available and have been used. No. 6 and No. 11 gauge fabric have also been used very successfully. In some cases, galvanized fabric has been used in permanent installations. The fabric is usually purchased in 50-foot rolls.

With the 2-inch opening, the holes for the bolts may be drilled through the fabric. The fabric is usually installed in panels placed perpendicular to the axis of the opening and the panels are often slightly over-lapped to give continuous bearing against the rock. In some cases, especially along the walls or ribs of an opening, the fabric may be installed with the panel parallel to the axis of the opening. Both of these methods are illustrated, along with specifications for materials used.

Specifications for CF&I Realock Chain Link Fabric Used for Underground Support Between Rock Bolts*

Realock Fabric Description, All with Knuckled Selvages	*Approximate Weight, Pounds per Lineal Foot*
36" width 2" mesh x #9	2.22
42" width 2" mesh x #9	2.59
48" width 2" mesh x #9	2.96
60" width 2" mesh x #9	3.70
72" width 2" mesh x #9	4.44
84" width 2" mesh x #9	5.18
36" width 2" mesh x #11	1.47
42" width 2" mesh x #11	1.72
48" width 2" mesh x #11	1.96
60" width 2" mesh x #11	2.46
72" width 2" mesh x #11	2.95
84" width 2" mesh x #11	3.44
36" width 2" mesh x #6	4.01
42" width 2" mesh x #6	4.68
48" width 2" mesh x #6	5.35
60" width 2" mesh x #6	6.69
72" width 2" mesh x #6	8.02
84" width 2" mesh x #6	9.36
Nominal wire diameter—	
# 9 Gauge	0.148 inch
#11 Gauge	0.120 inch
# 6 Gauge	0.192 inch
Tolerances—	
Diameter .. plus or minus	0.004 inch
Mesh ..... plus or minus	0.125 inch
Width ..... plus or minus	1.0 inch
Tensile strength—	
# 9 Gauge	95,000 to 100,000 psi
#11 Gauge	100,000 to 110,000 psi
# 6 Gauge	65,000 to 85,000 psi

*CF&I Realock chain link fabric meets all requirements of federal specification RR-F-191a dated April 5, 1955.

The mine rock bolts used with Realock fabric are usually made with an 8- or 10-inch long thread rather than with the standard 4½-inch long thread. This is to give enough thread so that the Realock fabric may be drawn tightly against the rock surface as the bolt is tightened.

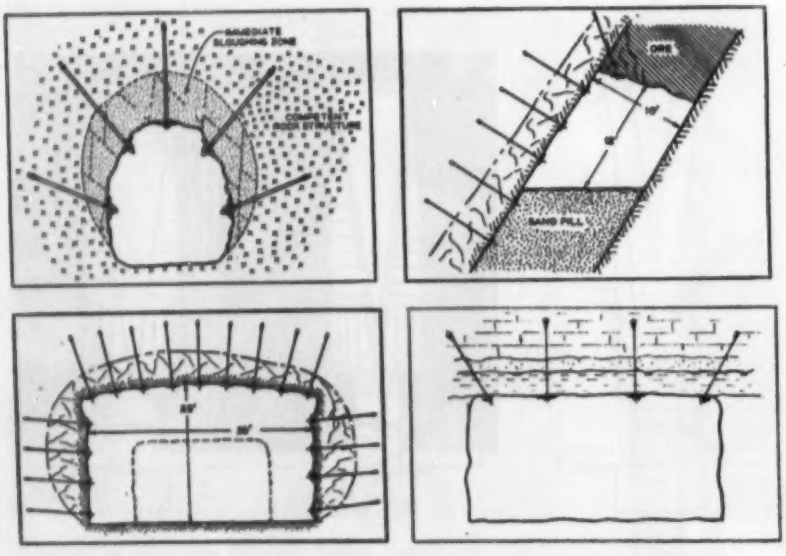
In order to clarify the use of Realock fabric with rock bolts, it is necessary to summarize the function of the rock bolts themselves in supporting the passageways necessary to reach and remove the ore body which is the primary object of any mining operation. In addition to maintaining these passageways, the voids caused by the extraction of the ore must be temporarily supported until the ore is removed and the voids filled with waste material. This is accomplished by one or a combination of the following methods: timbering, back-filling, pillaring, or, more recently, rock bolting.

Rock bolts of varying lengths depending upon conditions in each mine are now being used in rapidly increasing quantities to take the place of timber with both the 1 inch diameter wedge and slot and ¾ inch high strength expansion shell types being used extensively in metal as well as coal mines. The two types of rock bolts are illustrated in accompanying diagrams.

Among the advantages gained through the use of rock bolts are: they will fit any size or shape of excavation; a smaller opening can be made since timber is bulky and takes up considerable space; there are no obstructions to ventilation or mining operations such as slushing or loading; ease of transportation and storage; permanency; and in many cases they are less costly and time consuming to install and give greater safety than do timbers.

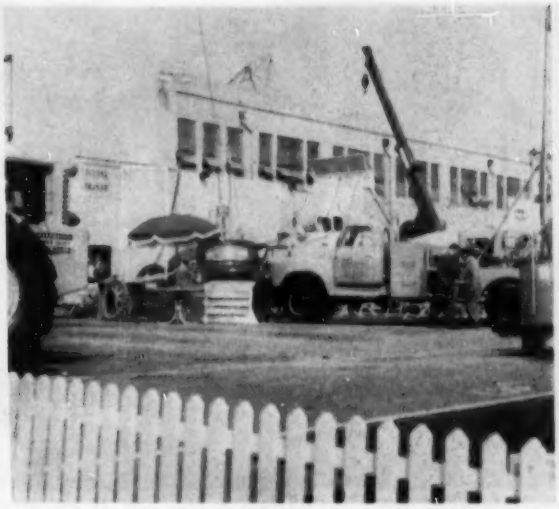
If rock bolts are installed immediately after the excavation is made, sloughing or spalling of the rock between rock bolts will be minimized but in some cases it will still occur and pieces of rock will fall out between the bolts even though the rock bolts will still prevent the opening from caving. In this case, some sort of lagging is needed between the bolts. Realock finds its greatest use for such lagging. Bolting and Realock applications are shown in diagrams.

The Realock fabric generally used with rock bolts is made of No. 9 gauge wire which is 0.148 inch in diameter and has a tensile strength of 95,000 to 100,000 pounds per square inch. The accompanying table gives complete specifications for Nos. 9, 11, and 6 gauge fabric.



TYPICAL ROCK BOLTING applications are shown in these four diagrams of mine workings.

MASSIVE EARTHMOVING EQUIPMENT with huge new bulldozers, haulage units and loading equipment was impressive. Was a wonderland for the small boy shown above.



EXHIBITS OVERFLOWED Shrine Exposition Hall at Los Angeles to outside arena where most of the heavy machinery was displayed for convention delegates.

New and Bigger Mine Equipment Paces Machinery Exposition in Los Angeles

Last month thousands of mining people from every walk of life filtered into Los Angeles, California, for four days to attend one of the greatest shows of them all—the 1956 American Mining Congress and Machinery Exposition. This was the year when manufacturers set up equipment exhibits in conjunction with the convention; the machinery displays are a powerful drawing card and operators headed out of the hills in swarms to find out what was new.

Though revolutionary new equipment items were possibly not quite as numerous as in the previous exposition in San Francisco two years ago, it was apparent that considerable progress has been attained in the industry. Uranium came in for its large share of attention as usual; but at the same time an increased emphasis on other important fields of the mineral industry was noted. Perhaps conditions are coming into sharper focus with uranium being shown in its true perspective with relation to the overall field of mining.

What the Future Holds

The Honorable Fred A. Seaton, Secretary of the Interior, in opening the Convention on Monday morning, October 1st, again reaffirmed the Department of the Interior promise that Congress will provide a long-range domestic mineral program when it reconvenes in January. Such a program will maintain a sound and vigorous mining industry, he promised.

The long-range program certainly should encompass an expansion of the present Government program, Mr. Seaton said. The tax laws should be re-examined under this program. The 1954 law changes have been helpful and other tax studies are being carried out. DMEA should be enlarged and made permanent, he added. Another point presently under study is that of imports. Simultaneously, trade policies are being examined by Congress.

Simon D. Strauss, vice president of American Smelting and Refining Company, reported that both United States and world mine production of copper, lead, and zinc will exceed 1955 production during the current year. Mr. Strauss also forecast an average higher price for these metals and a greater profit than in 1955. However, all is not as rosy as it sounds because both the copper and zinc stocks are up.

PROGRAM CHAIRMAN, Walter C. Lawson, general manager, Phelps Dodge Corporation, Douglas, Arizona, presided at the session of the "State of the Metal Mining Industry." Mr. Lawson is shown as he opened this session.

VENTILATION ENGINEERS took a long look at Joy Manufacturing Company's newly designed Microdyne dust separator. The unit is said to be 1/10 to 1/20 the size of comparable collectors and can be installed directly in a duct line.

TAKING A LOOK inside the cab of a new International Harvester, rear-dump truck was a convention delegate.

REVOLVING TABLE of Detroit Diesel Division of General Motors Corporation featured scale models of actual machinery powered by Detroit Diesel engines. Highlight of their exhibit, however, was a cutaway, working model of their new Turbopower units.

LOOKING over cyclones and valves at Equipment Engineers Inc. booth was J. A. Mecia of Utah Construction Company.

CLIMBING in and out of trucks, like this Kenworth model, was made easier by stairway leading to the cab.

BIG FLOTATION CELL with 200 cubic foot capacity featured exhibit of Denver Equipment Company.

AROUSING a great deal of interest was a rope suspended conveyor made by Goodman Manufacturing Company.

A Short Review of Some of the New Equipment Exhibited

Atlas Copco Inc. had a new push feed drill with a retractable stinger in the pusher leg. Allegheny introduced a new series "J" style rock bit of which they were quite proud. A huge 200 cubic-foot flotation cell featured the exhibit of Denver Equipment Company. The big machine could mean unit operation for some small capacity plants. Also in the field of concentration Bico, Inc. demonstrated a new sonic dry concentrator.

Arousing a great deal of interest among ventilation engineers was Joy Manufacturing Company' Microdyne dust separator which is said to be 1/10 to 1/20 the size of other units of similar capacity. In addition, Joy says that the separator can be installed right in the duct line. Reich Brothers Manufacturing Company introduced a Belgian down-the-hole drill to the United States at the Los Angeles show. This rig has produced some phenomenal footages where it has been applied abroad. Atlas Powder Company was enthusiastic about a new standard delay blasting cap which they say produces greater regularity in timing. Also their newly introduced Ammocore powder, which is a low grade ammonium nitrate with a high explosive core of gelatin, looked interesting.

Joy Manufacturing Company had two new drills which warrant close attention. One was the Junior Challenger, a 4½-inch wagon drill mounted on a track frame and featuring complete hydraulic positioning control. The second unit was an underground blast hole drill which handles rod sizes up to AW. Pettibone Mulliken Corporation unveiled a front end loader traveling on rubber tires.

International Harvester Company entered the off-highway haulage field for bulk earth moving with a brand new rear dump truck. Autocar Division of White Motor Company also introduced a heavy duty truck for open pit work.

A heavy duty grader featuring six wheel drive and steering was proudly presented by Austin Western Works. Boyles Brothers Drilling Company Ltd. displayed the new BBS-3 rotary core drill with a self centering hydraulic chuck and cat-head. Brunner & Lay Inc. presented new 6-inch carbide rock bits for blast hole work. Chicago Pneumatic Tool Company had a new self propelled wagon drill for greater drilling mobility; and C & D Batteries, Inc. featured higher capacity motive power batteries. Detroit Diesel Engine Division had cutaway working models of their new Turbopower engines. Euclid Division held the first west coast showing of the big TC-12 twin powercrawler at the Los Angeles Exposition. Of particular interest to mill men was a new hydraulically adjustable apex valve for cyclones made by Equipment Engineers, Inc.

New 4 and 6-inch Vacseal pumps with replaceable rubber liners were introduced by The Galigher Company; Timken Roller Bearing Company highlighted a tapered-socket carbide bit which was a very interesting development. The metallurgist had a first look at Sharples Corporation's new dry powder classifier for sizing in micron size ranges. A great deal of interest was generated in a rope suspended conveyor made by Goodman Manufacturing; this was exhibited along with locomotives of the Mancha Storage Battery Locomotive Division. Le Roi Division had an interesting light and compact stoper; Raybestos-Manhattan, Inc. had a new Poly V drive which consisted of a new type belt used with a specially designed pulley to mate with ribs in the belt. Gardner Denver created a great deal of interest with a new portable rotary compressor with a 900 cubic foot per minute capacity. Tungsten carbide balls for grinding mills were introduced by Kennametal.

Christensen Diamond Products has developed a new double core barrel and exhibited it at the convention. Caterpillar Tractor featured the Giant D-9 and the No. 955 Traxcavator front end shovel with an exhaust scrubber. Hewitt Robbins Inc. had a tremendously large (6-by 24 feet) vibrating screen on display. Eimco Corporation has developed new variations of the 105 machine; specifically a front end loader. American Manganese Steel Division demonstrated a new semi-automatic hard facing process, while Anaconda Wire and Cable Company displayed an improved shuttle car cable which uses cold rubber. Ingersoll Rand introduced a new Jackbit grinder; Sika Chemical Corporation had a whole variety of compounds for retarding, accelerating and expanding concrete and grout. Western Rock Bit Manufacturing Company featured new, used-to-destruction carbide bits. Thor Power Tool Company introduced a completely new air controlled, three boom jumbo. Western Machinery Company had a 1955 MINING WORLD Blue Ribbon winner on hand in the Remer jig as did Universal Engineering with the heavy duty Wobbler feeder. Western Precipitation Company introduced new automatic voltage control to maintain optimum voltage input to Cottrell precipitators. Hardinge Company used transparent working models to demonstrate the new Disc Roll mill. The list could go on and on, but this will give you some idea of new equipment available today.

These were some of the highlights of the equipment exhibit and may we suggest that you carefully scan the September issue of MINING WORLD for further information on these and other items. Space was so limited that we couldn't possibly cover new machinery developments in detail.

Lead is more stable with little change in supply-demand ratio. Of the three metals he believed that the copper price was the most vulnerable for a possible downward change. He foresaw little possibility of a change in the price of lead-zinc during the current year, lead being the most stable of the three in his opinion. Both lead and zinc in the United States have benefited by the Government stockpiling program. Foreign production of these two metals will benefit increasingly in the future as the Government barters surplus agricultural products for foreign metals.

Uranium

Senator Clinton P. Anderson of New Mexico, chairman of the Joint Congressional Committee on Atomic Energy, reported that the United States is now the Free World's leading producer of uranium. He also reported that the AEC estimates that there are $500,000,000 worth of uranium ore deposits in the Jackpile, Haystack, and Ambrosia Lake districts of New Mexico. Thus, the problem is not ore. There is plenty of ore and what the mining industry and the Atomic Energy Commission need is more reactors to burn and use the uranium potential developed in the last several years by the mining industry.

It is only the Government, he said, that can and must accept the responsibility for the uranium industry. It must speed uses for uranium. The domestic uranium mining industry must be kept alive during the period before full commercial uses have developed.

In direct contrast to Senator Anderson's remarks on the necessity for Government maintaining a uranium mining industry was the attitude of the Canadian government. This was

FROM GERMANY were these five engineers touring United States and Canadian mining operations. Pictured at Western Machinery Company's booth from left to right were Albert Fleisch, Kurt Krause, H. J. Flesch, Fredrick Stolze and Dr. H. Salau.

FROM JAPAN came Dr. Sumisaku Yajima, managing director of Nomura Mining Company, Ltd., Tokyo, Japan, who is entering MINING WORLD's diamond contest. Also shown are Gordon Gould, Max Holsinger, George Argall and Al Roberts.

DIAMONDS ARE A MINERS BEST FRIEND. Shown receiving a gem quality, ½-karat diamond from MINING WORLD's Max Holsinger is W. J. Howard of Sevier Minerals Company, Kingman, Arizona. At MINING WORLD's booth, delegates guessed number of imitation diamonds in a bowl and each day's winner was awarded a gem stone. Other winners were Cedric Guest, chief electrical engineer, Homestake Mining Company; Colin Harris, metallurgist at Mount Isa Mines Ltd., Queensland, Australia; and Mrs. R. B. Taylor, Parral, Chihuahua, Mexico. Mrs. Taylor is the wife of R. B. Taylor, manager Mexico operations, Eagle Picher Company.

expressed by Richard E. Barrett, manager of the Ore Procurement Division, Eldorado Mining and Refining Ltd., Ottawa, Canada. Mr. Barrett reported that the Canadian government had no plans to purchase uranium concentrates after 1962. By 1958, 43,000 daily tons of mill capacity will be in operation or under development. Under marketing agreements with both the United States and the United Kingdom, Canadian ore reserves of uranium are well ahead of commitment and contract demands. Accordingly, the Canadian government policy will be to keep the existing mines and mills in operation so as to preserve communities and that segment of Canadian economy benefited by existing plants. The policy will be to discourage development of new districts, new mines, and awarding of contracts for concentrate procurement from any new producers.

Exploration

We are now in the midst of one of the most successful periods of mine exploration in the history of North America, said Ira B. Joralemon, consulting engineer from San Francisco. In the United States 35 major ore deposits have been found or proved to be great since 1950, continued Mr. Joralemon. Twelve were uranium deposits, eight copper, five lead and zinc, three titanium, and seven nonmetallic minerals which included potash, phosphate, tungsten, fluorspar, and rare earths. His list did not include iron ore for which reliable data was lacking. The Canadians have been even more successful with 49 new mines in the past six years.

Open Pit Mining

Rotary drilling has come of age in mining all over the country. Describing tests on the iron range in taconite, R. W. Whitney, manager of mines for M. A. Hanna Company, said that the penetration rate of the 50-R rotary drill was approximately three times that of the 42-T churn drill with an overall reduction of 20 to 25 percent in drilling cost. Rotary drilling and a down-the-hole drill have completely replaced churn drills at Kaiser Steel Company's Eagle Mountain mine. Rotary drilling is generally confined to soft to medium hard ground and the down-the-hole unit in hard formations with great savings in cost per foot of hole drilled.

Open pit haulage, which breaks down into truck haulage, rail haulage, conveyor haulage and skip haulage was covered in papers on each of these subjects. L. S. Campbell of Oliver Iron Mining Division, United States Steel, said that properly installed conveyors offer tremendous

possibilities in open pit mines. On the other hand, improperly designed conveyors, he said, can be a costly source of trouble. R. P. Cardew of National Iron Company compared Rockover skip systems with other methods of haulage. He pointed out that moving ore from pit bottoms with skips combines some of the advantages of other methods of transportation. C. V. Isbell described the application of various off-highway haulage units in open pit work.

Churn drill sampling before mining began in Butte's Berkeley open pit yielded results which were remarkably close to actual ore shipments to date, and E. P. Shea, in charge of the Butte Geological Department of the Anaconda Company, told how the original reserves were outlined so accurately. Actual churn drill data was adjusted on the basis of checks obtained in sample crosscuts and raises.

Underground Mining

At Climax Molybdenum Company, a great deal of work has been done on a system of standardized measurements of underground rock drilling. This was reported by R. M. Stewart, assistant planning engineer at Climax, who went on to say that perhaps if similar standards were adopted by other companies on an industry-wide basis a broad base would be created for direct comparison of test results. Climax rates performance and unit cost of drilling on feet of hole drilled. A standard system would provide close control of costs, provide accurate recommendations for new equipment and increase the rate of development of new and improved machines, steel and bits.

R. W. Edwards, superintendent of Inland Steel Company, Ishpeming, Michigan, reviewed ground support methods in the Lake Superior District with these observations: The use of timber is decreasing; roof bolting is increasing where ground flow or subsidence is not a problem; and the use of the yielding arch set is rapidly spreading.

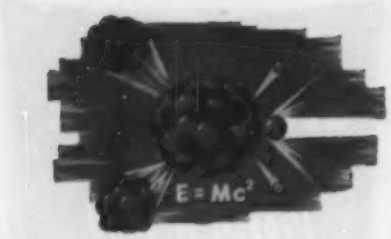
When St. Joseph Lead Company opened the Indian Creek mine in Southeast Missouri Lead Belt, slusher, slide-ramps mounted on Joy Drillmobile chassis were put into service with outstanding success. Using a 30-horsepower, 3-drum hoist, and a 54-inch box scraper, an average of 250 tons of ore loaded per shift has been obtained, according to Elmer A. Jones of St. Joseph Lead Company. Under ideal conditions as high as 600 tons have been loaded per shift; overall maintenance on the unit has been lowered to $0.115 per ton. The machine has fit in well with trackless mining which has proved so economical in that district.

Experimental and test work with a phosphate planer patterned after a German coal mining device was described by T. E. Howard of the Bureau of Mines and F. E. Burnet of Montana Phosphate Products. Full potential of the machine is yet to be determined but preliminary results look promising.

Solvent Extraction

Solvent extraction was discussed with the expression of several ideas. E. H. Crabtree and C. J. Lewis of the Colorado School of Mines Research Foundation, Inc. pointed out that solvent extraction is comparable in many ways to present ion exchange resin processes now used to recover uranium from leach solutions. Solvent extraction as applied to metallurgical processes was defined as an operation in which a selective organic, chemical solvent, immiscible with aqueous solution, is contacted with hydrometallurgical solutions or pulps to extract or remove metal values or impurities from the solution. The extracted material is subsequently removed from the solvent in a more concentrated, purified, or usable form. The above definition was provided by Robert S. Olson and Merrill F. McCarty of the Dow Chemical Company. Pointing out that a great deal of information on solvent extraction is available from other industries, solvent extraction as used metallurgically dates from recent uranium developments, according to Mr. Olson and Mr. McCarty. However, the authors went on to say that solvent extraction appears to be a promising recovery method for many metals, including base metals. Solvent extraction has the advantage of being a continuous process with simple equipment, also the recoveries are high, according to C. K. McArthur and John S. Breitenstein, respectively project manager and technical director, National Lead Company, Grand Junction, Colorado. These two report that solvents such as alkyl phosphates or di(2-ethylhexyl) phosphoric acid will be used for selective uranium extraction from sulfuric acid leach liquors at the Kerr-McGee mill at Shiprock, New Mexico and in the Climax mill in Grand Junction. Equipment installations at these mills are currently going forward.

The 1956 version of the American Mining Congress and Machinery Exposition is past history now. We have tried to cover some of the highlights and hope to see you in 1958.



FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

AEC Official Predicts Twelve Uranium Mill Contracts Will Be Signed During this Year

The number of new uranium mill contracts signed by the Atomic Energy Commission will reach 12 or more by the end of the year, predicted Allan E. Jones, manager Grand Junction Operations Office, United States Atomic Energy Commission. Speaking at the American Mining Congress convention last month, Mr. Jones said that five contracts for new mills have been signed during the year to date.

The significant developments of the uranium industry in the past year have been the continued increase in ore reserves in older mining areas and the discoveries of large ore bodies in new areas. Today, there are 33 known deposits capable of 100,000 tons production and eight known deposits capable of producing over 500,000 tons, according to Mr. Jones. He also said that another important factor in the uranium picture is that the major sources of supply have changed from areas containing many small ore bodies to new areas where large ore bodies give a much better assurance for a continuing ore supply.

The trend to mining larger deposits has caused a change in milling practice from the small custom mill to larger mills built for a controlled ore supply from large ore bodies and with minor dependence upon custom ores. Before 1954 no domestic uranium mill processed more than 300 tons per day, with milling costs ranging from $13.00 to $40.00 per ton of ore treated. Today only one western mill is rated at less than 300 tons daily capacity and four are now processing over 500 tons per day. Within the next several years there should be a dozen domestic uranium mills with at least 500 tons per day capacity and five of this group will be capable of treating 1,000 tons per day or more.

Mr. Jones stated that under present conditions processing costs range from $11.00 to $16.00 per ton for a 200-ton per-day facility, down to $6.00 to $8.00 per ton for a 2,000-ton-per-day facility. Capital costs, according to Mr. Jones, are about $10,000 for each daily ton of mill capacity for a 200-ton-per-day plant; but for a 2,000-ton-per-day mill, the capital cost is about $5,000 for each daily ton of capacity.

Efficiency of milling operations has increased, according to Mr. Jones. Before 1954 recoveries were in the low eighties. At the present time metallurgical recovery averages about 89 percent and is expected to improve to better than 90 percent with the full utilization of the newer processes and improvements.

Extended U_3O_8 Processing Contract to National Lead

An extension of National Lead Company's contract with the United States Atomic Energy Commission for the operation of the Feed Materials Production center in Fernald, Ohio has been granted. The contract became effective July 1, 1956 and will extend to June 30, 1961. National Lead Company of Ohio, a subsidiary of the parent company, has operated the plant facilities under a contract with the AEC since May 1, 1951.

The Fernald Feed Materials Production Center contains a number of plants where uranium concentrates are converted into highly pure uranium metal in various shapes. The processes used in the integrated facilities recover substantially all of the uranium contained in the concentrates; also a high proportion of the chemicals used in various treatment steps are regenerated or recovered. It is estimated that the annual cost of operating the AEC's Fernald works will run $38,000,000.

National Lead Company also operates the Monticello, Utah uranium processing mill, the ore testing pilot plant in Grand Junction, Colorado, and the raw materials development laboratory in Winchester, Massachusetts.

AEC To Buy Beryllium From Two Companies

The Atomic Energy Commission will buy 1,000,000 pounds of beryllium from the Beryllium Corporation of Reading, Pennsylvania and the Brush Beryllium Company of Cleveland, Ohio under two contracts recently awarded. Each company is to supply 500,000 pounds over a five-year period, at a price of about $47.00 per pound.

Beryllium Corporation will build a $4,000,000 facility possibly near Reading and is expected to start deliveries by mid-1957, while Brush will build a plant at Elmore, Ohio, with deliveries to begin early in 1958.

Utah Construction Gets 60% Control of Lucky Mc

Utah Construction Company has exercised its option to acquire 60 percent control of the Lucky Mc Uranium Corporation, thus setting in motion a $10,000,000 financing plan for construction of a uranium mill in the Gas Hills district of Fremont County, Wyoming. Utah Construction will receive 3,638,748 shares of Lucky Mc stock, increasing its total shares to 6,064,580.

The original contract between the two firms provided that Utah Construction would establish ore reserves on the Lucky Mc claims in that district; negotiate a mill contract with the Atomic Energy Commission; and finance and build the mill. In return it would receive the 60 percent interest.

Utah Construction recently purchased 16 uranium claims about two miles south of the Lucky Mc operation from O. A. Sutton of Wichita, Kansas. Mr. Sutton had purchased the claims, known as the Nuclear group, from some Lander, Wyoming prospectors for $32,000. His price from Utah Construction has not been revealed.

Homestake and Partners Plan New Mexico Mill

Homestake Mining Company has entered into a limited partnership agreement under which it will enter into negotiations with the Atomic Energy Commission for a mill construction contract in western New Mexico.

A 750-ton-per-day plant would be erected in the Ambrosia Lake area, according to plans, and Homestake would supervise design and construction. Ore to be treated would come from the United Western Minerals Company, J. H. Whitney and Company, White, Weld & Company, Rio de Oro Uranium Mines Inc., and from a new mine to be developed by Homestake.

The limited partnersip venture is to be known as Homestake-New Mexico Partners. Homestake is general partner and the limited partners are United Western and its associated groups, and Rio de Oro.

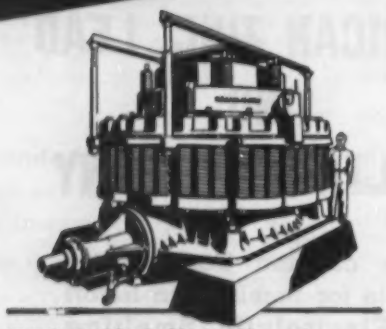
Seven Firms Offer To Produce Uranium Salts

The Atomic Energy Commission has received seven proposals from industrial concerns for production of refined uranium salts in privately owned plants. The product would be sold entirely to the government for further processing into fissionable uranium reactor fuel.

Those firms submitting the proposals were: Union Carbide Nuclear Company, division of Union Carbide and Carbon Corporation; Koppers Company and Kennecott Copper Corporation, jointly; Dow Chemical Corporation; Twentieth Century Materials Corporation; Climax Molybdenum Company and Mallinckrodt Chemical Works, jointly; General Chemical Division of Allied Chemical and Dye Corporation; and Vitro Corporation of America.

At present, the government controls all of this type of production. The work is conducted by Mallinckrodt at St. Louis, Missouri and the National Lead Company at Fernald, Ohio. Evaluation of the new proposals probably will not be completed before January 1, 1957.

This view, showing a specimen of an etched cross section of a molybdenum ingot, was furnished by Climax Molybdenum Co., who now use a 60" Symons Primary Crusher, 12 Symons Cone Crushers, and 25 Symons Vibrating Rod Deck Screens.



SYMONS CONE CRUSHERS . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter — in capacities from 6 to 900 tons per hour.

• MOLYBDENUM, from the Greek "*molybdos*", meaning lead, is popularly referred to as "moly", and has its main commercial source in the mineral molybdenite. Increasing production of molybdenum has been essential for the manufacture of alloy steels used extensively in aircraft, automotive, heavy machinery, and many other industries.

Largest producer of "moly" in the world is Climax Molybdenum Company, supplying well over half of the free world production. Located high in the Rockies in Colorado, this miracle mine of modern times is presently the largest underground mining operation in North America. At Climax, a battery of twelve 7-ft. Symons Cone Crushers handle the reduction crushing of the vast tonnages of hard crystalline rock bearing the molybdenite ore.

For in molybdenum production . . . *as in all the great ore and industrial mineral operations the world over* . . . Symons Cone Crushers are the outstanding choice of leading producers for processing great quantities of finely crushed product at low cost.

Nordberg Mfg. Co., Milwaukee, Wisconsin

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.

United States

Personalities in the News

Royale J. Stevens has been named consulting engineer on the staff of **S. D. Michaelson**, chief engineer of Western Mining Divisions, Kennecott Copper Corporation in Salt Lake City, Utah. Before accepting the Kennecott position, Mr. Stevens was assistant manager of the Roan Antelope Copper mine in Luanshya, Northern Rhodesia. Mr. Stevens has spent most of his life in Australia and Southern Rhodesia, where his father was a metallurgist.

George O. Argall, Jr., editor of MINING WORLD is one of seven leaders in western mining and chemical processing who will participate in a panel discussion on "Ideas for Future Cooperation Between the Chemical and Mining Industries." This is a feature of the San Francisco Chamber of Commerce's "Inter-Industry Conference" the first of its kind, to be held November 9. **S. H. Williston**, vice president of Cordero Mining Company, Palo Alto, will be moderator of the panel. Other panel members are **Russell Phillips**, senior chemical engineer, Stanford Research Institute; **D. C. Linton**, assistant to resident manager, Westvaco Mineral Products Division, Food Machinery & Chemical Corporation; **Richard M. Stewart**, mining geologist, California Division of Mines; **John C. Lokken**, manager of mining chemical sales, the Dow Chemical Company; and **Miles P. Romney**, manager, Utah Mining Association.

Jack L. Ashby, vice president and general manager of Kaiser Steel Corporation, Oakland, California, has been elected to the board of directors of the American Iron and Steel Institute.

Herbert C. Weingartner, a member of The Anaconda Company's auditing staff, will fill the newly created position of personnel manager of the company's western operations. **Mord Lewis** has been appointed vice president of Anaconda Aluminum Company. He was formerly assistant to the vice president in charge of operations of The Anaconda Company.

Lowell B. Moon will be general chairman of the Northwest Mining Association's 62nd annual convention in Spokane, Washington November 30-December 1. Mr. Moon is district geologist in charge of the Spokane Northwest district office of Bear Creek Mining Company. **A. E. Weissenborn** will be vice chairman and **Wing G. Agnew**, program chairman. **Karl Jasper** is NMA president.

W. M. KELLEY, president of Reserve Mining Company, with headquarters in Duluth, Minnesota, directed the construction program of the company's huge new taconite processing plant, the E. W. Davis Works at Silver Bay, Minnesota. Formerly, Mr. Kelley was vice president in charge of operations for Republic Steel Corporation. See MINING WORLD, page 52, October 1956 for a complete description of the new plant.

Luther G. Hendrickson has been appointed supervisor, field development, for U. S. Steel's Oliver Iron Mining Division. Mr. Hendrickson has been with the division since 1951 and since 1953 had been assigned to the Pilotac taconite concentrating plant in Mountain Iron, Minnesota as a development engineer.

Russell W. Beamer has been chosen executive secretary of the recently-formed Wyoming Mining Association. For 12 years he was on the staff of the Rochester-Pittsburgh Coal Company in Pennsylvania. His new office will be in Riverton, Wyoming where the Association president, **R. Lauren Moran**, also has his headquarters.

W. R. Hudspeth, Foote Mineral Company mill superintendent in Kings Mountain, North Carolina, has been promoted to general superintendent and assistant operations manager of the company's Sunbright, Virginia plant.

Gale A. Hansen succeeds **William A. Harrigan**, resigned, as superintendent at Keetley, Utah for New Park Mining Company. He has been resident manager for Northwest Uranium Corporation in Spokane, and before that was mine superintendent for St. Joseph Lead Company's Aguilar, Argentina lead-zinc mine.

H. J. Hull, Wallace, Idaho mining attorney and president of Nabob Silver-Lead Company, has been elected president of Princeton Mining Company. The Princeton silver-lead prospect east of Mullan, in Shoshone County, is being developed by Hecla and Bunker Hill mining companies under a profit-sharing agreement.

John M. Wright, superintendent of underground mining for San Francisco Chemical Company's phosphate operations at Montpelier, Idaho, is the new general superintendent for U. S. Potash Company at Carlsbad, New Mexico.

Leonard D. (Jerry) Jarrard resigned as district supervisor in Butte, Montana of the United States Atomic Energy Commission's Raw Materials Division for Washington, Oregon, Idaho, and Montana. He will establish a geological and engineering consulting service in Butte.

Roland E. Durocher has been named assistant manager of the Minnesota Ore Division of Jones and Laughlin Steel Corporation, Virginia, Minnesota. Prior to this appointment he had held the same position for the New York Ore Division of Jones and Laughlin.

J. W. Faust, former assistant manager of Peru Mining Company, has replaced retired **Joseph H. Taylor** as manager of operations for the company and its subsidiaries. Mr. Taylor has been vice president and manager since 1940 and will continue as vice president and serve the company in an advisory capacity.

John R. Porter, president of the Porter Oil & Gas Company, of Oklahoma City, Oklahoma, was elected to the vacancy on the United Western Minerals board of directors replacing Anneliese Simpson, who resigned. The company, with head offices in Santa Fe, New Mexico, issued $351,000 of common stock at $2 a share to a group of investors headed by Mr. Porter.

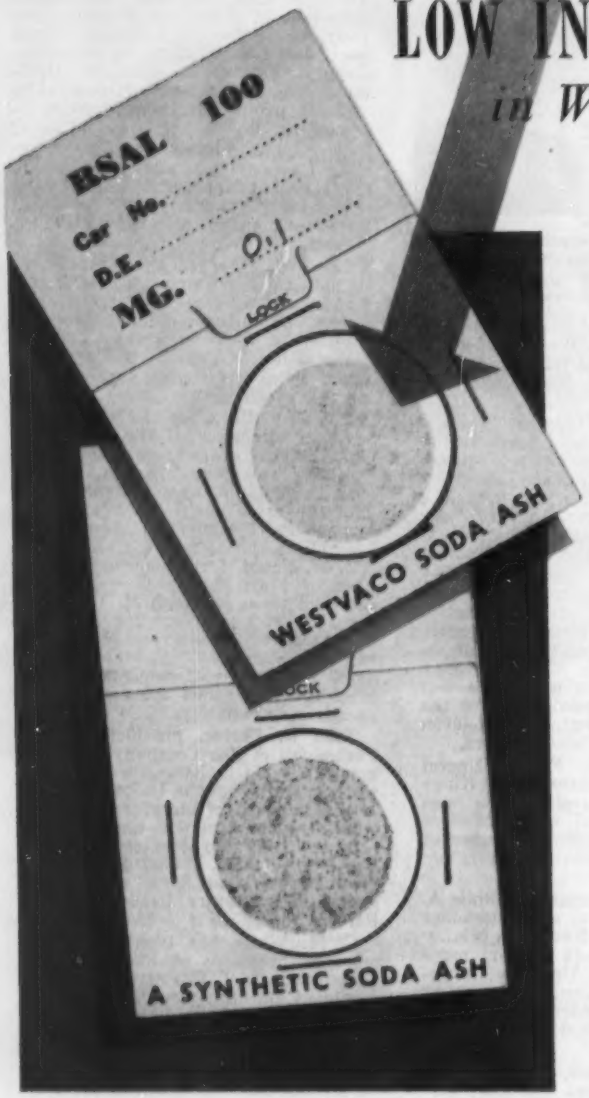
C. M. White has turned over his office as president of Republic Steel Corporation to **T. F. Patton**, assistant president and first vice president. Mr. White will still be chief executive officer and has been elected chairman of the board of directors, the position held by **T. M. Girdler** from 1930 until he retired recently. **Norman W. Foy**,

The Anaconda Company has announced the promotion of six officials at its reduction plant in Anaconda, Montana. They are (left to right): FRANK H. DAY, who has moved up from superintendent of the Cananea Consolidated Copper Company smelter at Sonora, Mexico to be assistant general superintendent in charge of the fire metallurgy department at Anaconda; JOHN R. MOORE is the new assistant general superintendent in charge of the hydro metallurgy department, and he is replaced as project and development engineer by CHARLES M. HOLSTROM, former superintendent of the zinc department; F. ADOLPH SALOMONSON is now in charge of the zinc department, moving up from his previous position as superintendent of the roasting department; J. HOLLIS MC CREA, past superintendent of smelting, has been advanced to metallurgist; and EMIL S. KRAMLICK, former superintendent of the reverbatory department, replaces Mr. McCrea.

Milk-Pad Test Demonstrates

LOW INSOLUBLE RESIDUE

in Westvaco® Soda Ash



The American Public Health Association uses this test to determine the insoluble impurities in milk. But the milk-pad test also graphically shows the low insoluble residue in WESTVACO Soda Ash. There's a very simple "reason why" this is so!

To make WESTVACO Soda Ash, we mine thousands of tons of unbelievably pure trona underlying our Westvaco, Wyoming plant. Then we crush it and dissolve it. Right here insoluble impurities drop out. They never do get to the crystallizer or the calciner from which refined soda ash emerges as the end-product of our patented process.

Low insolubles is only one of its inherent qualities. Others are low iron, low salt and sulfate, low calcium. Equally important are high purity (99.8% Na_2CO_3), high rate of dissolution and exceptional flowability.

Users from the Mississippi Valley to the Panhandle to the Pacific benefit by this nearby source of high quality soda ash. May we send samples and quote?

Westvaco® CHEMICALS

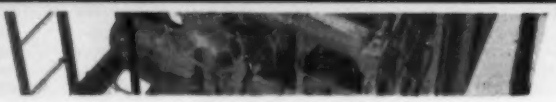
fmc FOOD MACHINERY AND CHEMICAL CORPORATION

Westvaco Chlor-Alkali Division

FOOD MACHINERY AND CHEMICAL CORPORATION

161 E. 42nd St., New York 17 · Chicago St. Louis Denver Philadelphia So. Charleston, W. Va.

FMC CHEMICALS INCLUDE: BE-CO *Peroxygen Chemicals* • WESTVACO *Alkalies, Chlorinated Chemicals and Carbon Bisulfide* • NIAGARA *Insecticides, Fungicides and Industrial Sulphur* • OHIO-APEX *Plasticizers and Chemicals* • FAIRFIELD *Pesticide Compounds and Organic Chemicals* • WESTVACO *Phosphates, Barium and Magnesium Chemicals*



vice president in charge of sales, was elected to replace Mr. Girdler as director.

V. D. Perry, chief geologist for the Anaconda Company, moved his headquarters from Salt Lake City to New York recently. **Roland B. Mulchay** of Tucson, Arizona will be in charge of Anaconda explorations in western United States and Mexico as assistant chief geologist. He will also supervise geological work at Mexico operations and in all western states except Montana. **James L. Kelly**, chief geologist at Anaconda uranium operations, has been named to succeed Mr. Mulchay as division geologist at Tucson.

Dr. Gordon E. Zima has joined the staff of the Bayonne Research Laboratory of the International Nickel Company, Inc. as a research metallurgist in the field of high temperature metallurgy. **Alden P. Edson** has been transferred from Bayonne to the New England technical field section. **Charles M. Schillmoller** has joined the staff of the west coast technical field section of International Nickel's development and research division.

John E. Ellis will fill the newly created position of superintendent of maintenance at the Crucible Steel Company's Crucible, Pennsylvania mine. He was formerly employed at the mines of Allied Chemical & Dye Corporation in West Virginia.

The Committee for Economic Development (CED), a national, non-profit economic research and education organization held elections recently to choose new board members for a three year term. Among those elected were **Robert B. Anderson**, president of Ventures Limited, Toronto, Canada; **Nathanael V. Davis**, president of Aluminium Limited Incorporated, Boston, Massachusetts; and **Alden G. Roach**, president, Columbia-Geneva Steel Division, United States Steel Corporation in San Francisco, California.

E. P. Pfleider, head of the University of Minnesota's department of mining engineering, has spent some time recently on a consulting trip to the nickel mines of Cuba.

J. B. Cummings is the new administrative assistant in charge of exploration activities for the Potash Company of America. Mr. Cummings formerly conducted exploration and shaft sinking operations as resident manager of Potash Company of America, Ltd., Saskatoon, Saskatchewan, Canada.

Ruth Anne Richmond, a graduate of the University of Nebraska, is the first woman graduate engineer to be employed by the Western Mining Divisions of the Kennecott Copper Corporation. She is now with the Kennecott Research Center in Salt Lake City, Utah.

Tibo J. Chavez, former lieutenant-governor of New Mexico and now an attorney in Belen, was elected secretary of the Ranchers Exploration and Development Company at the annual meeting in Albuquerque. **Dennis Cowper**, another Belen attorney, was named treasurer.

C. M. Hickman of Grand Junction, Colorado has moved up to the position of president for Moab Uranium Company, after serving as executive vice president since the company's organization. He succeeds **Joseph Kejr** who is now vice president. Other officers are **Arthur Maiss**, vice president, and **Mrs. C. M. Hickman**, secretary-treasurer. The company has recently acquired part interest in two base metal mines and one gold mine near Lake City, Colorado.

George W. Nilsson, mining attorney and secretary of the Mining Association of Southern California, gave a run-down on recent changes in mining law to about 50 members and guests at the September meeting of the Association in Los Angeles.

Lewis G. Nonini, former Wallace, Idaho geologist, was honored by the government of the Republic of Korea recently. Mr. Nonini is chief of the mining section of the United Nations Korean Reconstruction Agency, and for his otustanding service in this capacity was presented with an illuminated scroll bearing a letter of appreciation from the Korean government. **Kim Il Hwan**, minister of commerce and industry, made the presentation on the occasion of transfer of title of the Taejon mineral assay laboratory to the Korean government by UNKRA.

Clarence H. Sleeman has been appointed chief mining and development engineer for the Ore Mines and Quarry Division of the Jones & Laughlin Steel Corporation. Prior to this he was assistant manager of the Minnesota Ore Division of the company.

Lou Cope has left Pioche, Nevada to fill the post of mill superintendent for the Buchans Mining Company, Ltd. in New Foundland. Buchans is an American Smelting and Refining Company subsidiary.

Newsmakers in International Mining

ALAN R. TURNER has been appointed western projects engineer for the Photographic Survey Corporation Limited and its new engineering associate, Hunting Technical Services Limited, both of Toronto, Canada. Mr. Turner was assistant to the manager of PSC's Western Division in Vancouver previously. His new headquarters are in Calgary.

Goosen Broersma, Dutch metallurgist and mining engineer, has been named general manager of the Corporacion Minera de Bolivia which manages the nationalized mines of the country. The creation of this new position was approved by the Bolivian government recently after an extensive study had been made to improve the efficiency of the Corporacion. Mr. Broersma has been active in Bolivian mining for several years, and has been acting general manager for the Corporacion for the last six months. **G. L. Haighton** has been appointed as manager of the Colquiri unit of the Corporacion. **M. L. Moore** has resigned as manager of the Bolsa Negra unit.

Robert L. Loofbourow, consulting mining engineer and geologist, has returned to his headquarters in Minneapolis, Minnesota following a trip around the world. After visiting mining districts in Europe he spent a month in the Philippine Islands. While in the Islands he made an examination of Atlas Consolidated Mining and Development Corporation's Toledo mine in Cebu. He made a similar examination a year earlier.

V. M. Sundara Rajan has succeeded **W. T. Hocking** as superintendent of Nundydroog Mines (KGF) Ltd., Oorgaum, South India.

Sir George Davenport, formerly Minister of Mines in Southern Rhodesia, has been appointed Rhodesian representative of the Johannesburg Consolidated Investment Company. This company was recently granted an exclusive prospecting right to a 59-square-mile area in Southern Rhodesia and, under the terms of the government regulations, appointed an official representative.

Luis Solis Garcia has been elected president of Banco Minero del Peru to replace **Edgardo Portaro** who is now a senator at the new Congress.

Arvid E. Honkala has been promoted to mine superintendent of New York and Honduras Rosario Mining Company's El Mochito mine in Honduras. He was formerly assistant mine superintendent.

F. C. Lendrum is the new works manager at Eastern Mining & Smelting Corporation, Ltd. in Chicoutimi, Quebec, Canada. Previously he was manager for Ascot Metals Corporation, Ltd., Sherbrooke, Quebec.

D. O. Beckingham, one of the managers of the Anglo American group, has been named a director of the Anglo American Corporation of South Africa, Ltd.

Frederick G. Sharp has accepted the position of superintendent of Mysore Gold Mining Company (KGF) Ltd., Mysore State, South India. Until recently he was superintendent of the Hyderabad Gold Mines Company Ltd. and representative in Hyderabad for John Taylor & Sons.

Edward T. Knight has been appointed general manager of the New York and Honduras Rosario Mining Company, with headquarters in Honduras. Mr. Knight was formerly exploration manager of the company's subsidiary, Rosario Exploration Company, at Grand Junction, Colorado.

The United States Atomic Energy Commission, as part of a program for international cooperation in uranium exploration, conducted an 18-day tour of uranium deposits and ore processing facilities in the western United States for 36 distinguished foreign geologists and engineers. The group began the tour September 27 at Albuquerque, New Mexico.

Argentina representatives for the tour were **Victorio Angellelli**, mining consultor, and **Peter Stipanicic**, geology consultor, both for the National Commission of Atomic Energy; and **Hector Santillan**, postgraduate student. Australia sent **A. W. G. Whittle**, chief mineralogist and petrologist. **Geraldo C. Melcher** represented the Geological Survey of Brazil.

A. H. Lang was the representative for the Geological Survey of Canada; **Gino Bucchi Cariola**, ministerio de relaciones exteriores, came from Chile; **Dr. Jesus A. Bueno**, subdirector, Institute Geologico Nacional, Colombia; **S. H. U. Bowie** from the Geological Survey and Museum in London, and **Colin B. Campbell**, geologist for the United Kingdom Atomic Energy Authority, England: **Oke Vaasjoki**, state geologist, Geological Survey of Finland; **Mr. Carratt**, chief of mining division of Grury, and **Mr. Gangloff**, geologist, both from the Commissariat l'Energie Atomique, France; **Albert Maucher**, head of Geological Institute, University of Munich, Germany; **D. N. Wadia**, geological advisor, Department of Atomic Energy, India; **Katsu Kaneko**, director, and **Motoo Sato**, chief of mineral deposits division, Geological Survey of Japan.

Eduardo Schmitter, Jesus Ruiz Elizondo, and **Jose Rodrigues** represented the Institute of Geology, University of Mexico; **H. E. Fyfe**, chief geologist, New Zealand Department of Scientific and Industrial Research, Geological Survey; **Olge F. Adamson**, geologic adviser to Minister of Defense, Norway; **Dr. Nazir Ahmed**, chairman of Pakistan's Atomic Energy Committee; **J. A. E. Bennett, Mina da Urgeirica, J. S. Byrne**, Companhia Portuguesa de Radium, and **James Cameron, Mina da Urgeirica**, Portugal; **Robin B. McConnell**, director, Geological Survey-Swazililand Protectorate, **E. F. Mariand**, Union Corporation, and **Louis J. Nel**, Geologic Unit of Atomic Energy Board, South Africa; **Manuel M. Alia**, chief geologist, and **Mr. Morales**, engineer, Junta de Energia Nuclear, Spain; **Carl Martensson**, Chief geologist, Atomic Energy Company, Sweden; **Melih Tokay**, director of geology department, Maden Tetkik ve Arama Enstitusu, Turkey; **Armando Schwarck Anglade, Carlos Rodrigues Ponto**, and **Carlos Ruis Carmona**, all of the Ministry of Mines, Venezuela.

SEI ARAKANE (above) is the new head of the metallurgy department, in Tokyo, of the Mitsubishi Metal Mining Company, Ltd., Japan. Previously he was manager of the Naoshima smelter for the company. This position is now filled by Mr. Bada, former manager of the Akita plant.

AMADO B. ARRIETA (left), mine superintendent of the Atlas Consolidated Mining and Development Corporation, Toledo, Philippines, was photographed while attending the American Mining Congress show in Los Angeles during October. He is currently visiting mines in western United States and Europe. R. B. QUICHO (right), from the Philippine Bureau of Mines in Manila, also was present at the AMC mining show. He has been studying nickel refining methods in the United States.

JOHN W. HANLEY is the new chief metallurgical engineer for the Cerro de Pasco Corporation. He was formerly in charge of coordinating the zinc development program, and before that served for several years as assistant manager of the company's Peruvian operations. Mr. Hanley has been associated with Cerro de Pasco since 1933.

5 "Euc" REAR-DUMPS

10 to 50 Ton Capacities

for CONSTRUCTION, MINE, QUARRY and INDUSTRIAL WORK

10-Ton

Model UD has 128 h.p. engine . . . 10-speed transmission . . . 36 m.p.h. loaded travel speed . . . spring mounted drive axle with 12.00 x 24 duals.

Euclid Rear-Dump hauling units for off-highway service are available in five sizes with capacities of 10, 15, 22, 34 and 50 tons. They have diesel engines of 128 to 600 total horsepower.

The simple rugged construction of "Eucs" pays off in long life and low maintenance cost. You get more work-ability because there's less down time for repairs. There are more Rear-Dump "Eucs" in service than all other makes of off-highway haulers combined.

Have your Euclid Dealer give you facts and figures on the complete line of Rear-Dumps and other Euclid equipment . . . you may find, as hundreds of owners have found, that ***Euclids are your best investment.***

EUCLID DIVISION, GENERAL MOTORS, Cleveland 17, Ohio

15-Ton

There are two 15-Ton models with 5-speed transmission and 14.00 x 24 tires. Model FD has 165 h.p. engine, and 10 cu. yd. body. Model R-15 has 218 h.p. engine, spring mounted drive axle, power steering and 10½ cu. yd. body. Quarry body is available for either model.

22-Ton

Model TD "Euc" is equipped with 300 h.p. engine, spring mounted drive axle with 18.00 x 25 duals, power steering and 15 yd. body. Available with Torqmatic Drive or 10-speed transmission. Standard or quarry body is available.

34-Ton

Model FFD has two engines providing a total of 400 or 436 h.p. to tandem drive axles through separate Torqmatic Drives. Dual tires are 16.00 x 25. Exhaust heated body has 24-yd. capacity.

50-Ton

Similar in design to the Model FFD "Euc", the 50-ton Twin-Power Model LLD has a total of 600 h.p. and an exhaust heated body with 32-yd. capacity. Tires are 18.00 x 33.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Cerro de Pasco Builds Access Road To Connect Huge Antamina Copper Deposit with Railroad

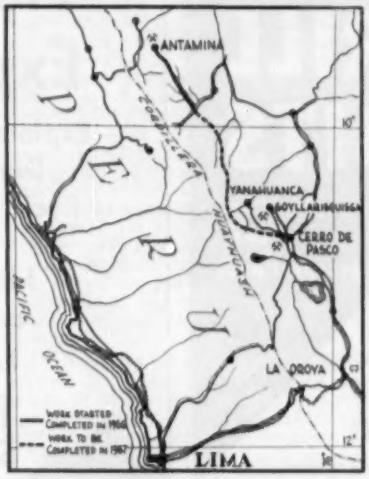
Cerro de Pasco Corporation is going ahead with plans for construction of a heavy duty highway from the Antamina copper deposit to the Cerro de Pasco railway, a distance of about 200 kilometers. The Antamina deposit is estimated to contain more than 70,000,000 tons of better than 1.0 percent copper ore.

On the accompanying map, the black line shows the 47-kilometer section which should be completed this year. The second section of the road, indicated by dotted lines, will be undertaken after the rainy season next year. Ore and concentrates can then be trucked from the mine to a rail point near the town of Cerro de Pasco, and then transferred to railcars for the balance of the trip to the Oroya smelter.

The route of the new highway was selected on the basis of lower construction, maintenance, and operating costs, after an aerial survey of the district by Photographic Survey Corporation of Canada, in cooperation with the Servicio Aerofotografico Nacional. Ground surveys had also been made by engineers of Cerro de Pasco.

Exploration of the Antamina deposit was carried out between 1951 and 1953. About 1,330 meters of tunnels, 528 meters of diamond drilling, and more than 1,200 meters of surface trenching were completed during this time at a cost of about $150,000.

After a study of more than 3,500 ore samples, the company is now considering



two possible development programs. One would be to mine the high-grade ore (3 percent copper) estimated at about 5,000,000 tons, with an output of 500 tons per day. This would cost about $6,000,000. The alternative would be to develop the low-grade deposits of better than 1 percent copper. This would cost about $80,000,000 and would include the installation of a 15,000-ton-per-day concentrator.

India Regulates Iron And Manganese Exports

India has placed an export duty on manganese ore and has set export quotas for manganese and iron ore through two separate orders issued by the government.

Under the first order, export quotas will be allotted separately for each port of shipment; export quotas will be granted to private shippers and mine owners on the basis of two thirds of quotas allotted them in July-December, 1955; exporters who may have shipped quantities of ores in excess of their initial quota allotments for July-December, 1955, will be granted supplementary quotas equal to three fourths of the additional quantities shipped; and freight cars will be allotted by the railroad authorities on a pro rata basis to ore exporters.

The second order provides that export quotas will be granted private firms that did not either receive a quota or make shipments of iron or manganese ores in July-December, 1955. Such firms will receive a quota equal to two thirds of the quota allotted them in the January-June, 1956, licensing period, plus three fourths of any shipments made by them during the period in excess of the initial quota allotment. Quotas for iron and manganese ores will be issued the State Trading Corporation by the chief controller of imports and exports within a ceiling of one third of the total quantity to be allowed for export in July-December, 1956.

The export duty on manganese is levied according to grade. With a manganese content of over 38 percent but under 40 percent, the rate is 10 Rupees per ton; with a content above 40 percent but under 44 percent, 20 Rupees per ton; over 44 percent it is 33 Rupees per ton. Ore with a content of 38 percent or less is exempt from the duty.

Reportedly, this amounts to about 15 cents per unit of manganese on high-grade material or nearly three times the U.S. import duty. Apparently, at Atlantic ports, Indian high-grade manganese ore will cost about $1.55 per unit, and possibly higher if ocean freight rates increase.

Japan Needs More Iron Ore Imports From The Americas

In an effort to supply blast furnaces with 7,340,000 tons of iron ore in fiscal year 1956, Japan has increased ore purchase prices about $4.00 per ton and is turning to both North and South America for additional supplies.

Operational, technical, and political difficulties in the Philippines and India have reduced the anticipated imports of ores from those countries. Despite increased imports from Malaya, Hong Kong, Goa, and South Korea, an iron ore shortage is ahead. Therefore, additional contracts have been made extending, in part, through 1957 and beyond to insure an adequate supply of ore. Import contracts made with miners in the Americas include: Texada Island, Canada, 700,000 tons, delivery over two years from February 1956; Marcona, Peru, 300,000 from July 1956 through December 1957; Eagle Mountain, California, 150,000 from July 1956 through March 1957; Vancouver Island, Canada, 120,000 from September 1956 through March 1957; MacCacheno, Canada, 1,380,000 from May 1957 through 1930; Heizer mine, Nevada, 138,000 from August 1956 through March 1957; and Lovelock, Nevada, 210,000 from June 1956 through March 1957.

From the long-range standpoint, Japan must seek more ore from mines in India, Philippines, Burma, and particularly, Hainen Island.

New Rio Tinto Companies To Operate in Rhodesia

Rio Tinto Company of London has formed three subsidiary companies for mining operations and exploration north of the Limpopo River in the Rhodesias of Central Africa.

The principal subsidiary is Rio Tinto Mining Company of Central Africa, Ltd which holds substantial interest in the other two companies and has an operating capital of £1,000,000. The two others are Rio Tinto (Northern Rhodesia), Ltd., with an authorized capital of £300,000, and Rio Tinto (Southern Rhodesia), Ltd., with £50,000.

Rio Tinto of Central Africa will be a wholly owned subsidiary of the London company, but companies in the Rio Tinto group may hold interest in the Northern Rhodesia and Southern Rhodesia subsidiaries.

In the past, Rio Tinto of London has carried on its geophysical and exploration work in the Rhodesias through Mineral Search of Africa Ltd. under the direction of Dr. Oscar Weiss.

ASARCO Undertakes Rhodesian Exploration

The American Smelting and Refining Company has taken an option on the 1000-square-mile Lunga Concession located northwest of Lusaka in Northern Rhodesia from the New Discovery Mining Corporation. This concession was granted to New Discovery by the British South Africa Company.

ASARCO will explore the concession with particular reference to a large limonite deposit which is expected to require deep core drilling. New Discovery has contracted to do the exploratory work on behalf of ASARCO.

President and General Manager of New Discovery Mining Corporation is Raymond Brooks, formerly manager of exploration for Rhodesian Congo Border Concession during the 1920's. Mr. Brooks' partner in this venture is Philip M. King, Sr., who financed it, and who is well-known in United States and Canadian mining development circles.

Fansteel Will Build $6,000,000 Ta-Cb Plant

A $6,000,000 plant will be built by Fansteel Metallurgical Corporation to increase present production of tantalum by 50 percent and columbium by 150 percent. The firm is presently completing its $1,000,000 expansion of its North Chicago, Illinois plant which is already unable to meet rapidly growing demands for these metals. The new site will be in another part of the country in order to achieve geographic dispersion of strategic facilities in keeping with the defense program.

QUEENSLAND–*Consolidated Zinc Pty.* has confirmed the reported discovery of a large bauxite deposit on the western side of Cape York Peninsula. Several hundred million tons are believed to exist in one section of the deposit, and grade is to be determined by the end of the year. Prospecting operations have been based on the Weipa River Mission, one of the most remote areas in Australia.

REPUBLIC OF THE PHILIPPINES –*Mindanao Mother Lode Mines'* new copper property at Zambales treated 32,464 metric tons of ore during the first eight months of operation. This yielded 3,179 tons of concentrates bearing 1,880,909 pounds of copper.

NEW GUINEA–For the three-month period ended August 31, 1956, *Bulolo Gold Dredging, Ltd.* dredged 2,112,000 cubic yards for a recovery of 8,838 ounces of fine gold; in the same period of 1955, the firm dredged 3,249,500 cubic yards to recover 6,754 ounces. On May 13, the firm's No. 7 dredge capsized and sank following the breaking of a ladder hoist shaft. A satisfactory insurance settlement was made and, although it will mean dredging an area of sub-marginal ground at a later stage, the reserves formerly available for the No. 7 dredge will now be dug by the No. 5 dredge after completion of its own reserves. It is expected that No. 4 dredge will be finally closed down during this fiscal year since it has exhausted its own reserves. Sluicing of bench gravels above river level is expected to continue at a profitable rate for some years.

REPUBLIC OF THE PHILIPPINES– *Marsman and Company* is proceeding ahead of schedule with enlargement of its mill at the *Itogon* mine, and additional units are expected to be in operation early next year. During August, the mine produced 2,697 ounces of gold worth Pesos 306,169, an improvement over the preceding month when production value was Pesos 288,508. At the company's *Suyoc* property, rehabilitation and reconstruction work is making steady progress. Old and new tunnels are being opened and new equipment is being installed. Ore samples have shown copper content ranging from 0.12 to as high as 16.7 percent.

QUEENSLAND – *Tableland Tin Dredging N.L.* at Mount Garnet treated 3,215,234 cubic yards of ground for a return of 788 tons of tin concentrates in the 12-month period ended June 30, 1956. Average yield of tin per cubic yard was 8.78 ounces. Working costs were 22.15 pence against 23.16 during the previous year. This is still the only large tin dredge operating in Australia; the nearby tin dredge of *Ravensthorpe Tin N.L.* has not yet gone into production.

REPUBLIC OF THE PHILIPPINES –August production figures in the mining industry were generally on the increase. *Bagulo Gold Mining Company* milled 13,368 tons of ore for a recovery of 2,476.13 ounces of gold worth Pesos 279,316, while July figures showed 12,883 tons of ore milled for a recovery of 2,595.23 ounces of gold worth Pesos 291,356, *Palawan Quicksilver Mines* produced 23,688 pounds of mercury in August compared with 21,120 pounds in the previous month. *Surigao Consolidated Mining Company* produced 4,535 ounces of gold, 3,412 ounces of silver, and 426,318 pounds of lead concentrates worth Pesos 588,515 in August. *Lepanto Consolidated Mining Company* produced 4,932 tons of concentrate estimated to contain 2,377,220 pounds of copper and 3,674 ounces of gold. The concentrates averaged 24.1 percent copper and 0.745 ounces gold per dry short ton. The 38,891 tons of ore milled during the month averaged 3.23 percent copper and 0.115 ounce gold per ton. *Atlas Consolidated Mining and Development Corporation* had a combined iron and copper production valued at Pesos 2,010,000, representing 5,223 dry short tons of copper concentrate and 24,800 metric tons of iron ore.

INDONESIA–A sulphur plant will be erected in Namora-i-langit, north Sumatra. It is hoped that production will start some time next year. The plant will be managed by Japanese technicians.

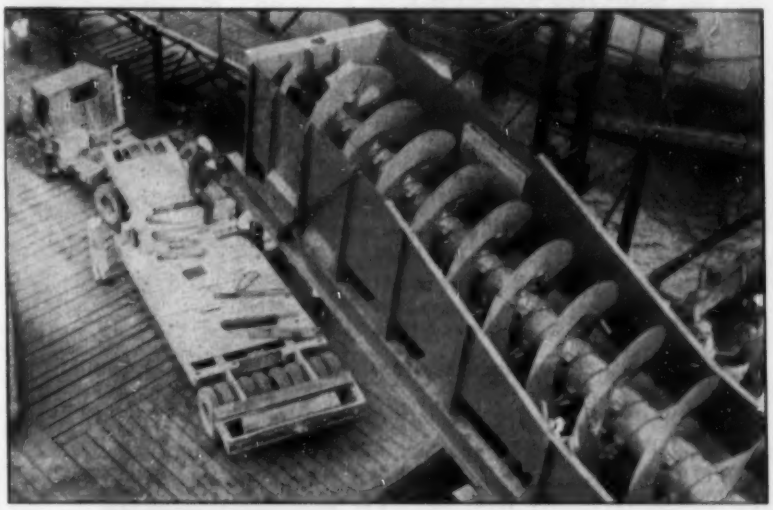
WESTERN AUSTRALIA – *Western Uranium Mines N.L.* has made good progress in building a copper treatment plant at Ravensthorpe. Unwatering and reconditioning of the Elverdton shaft is progressing and copper precipitation launders have been installed. Exploratory diamond drilling has continued along the Elverdton-Desmond lode. At a point 1,200 feet south of Elverdton shaft, strong lode assaying 3.75 percent copper over a true width of 6 feet has been intersected 50 feet below the surface. This hole is 700 feet south of the previous southern ore limit.

NEW SOUTH WALES–The New South Wales Government will waive or reduce royalties payable for any future production of copper or gold at Cobar. *Mines Exploration Pty. Ltd.*, a subsidiary of *Broken Hill South Ltd.*, will continue its option over leases at Cobar held by *New Occidental Gold Mines N.L.* with a view to working in depth the known copper-gold sulphides. No decision has been reached regarding the working of the mines and recent declines in copper prices may have affected the position.

REPUBLIC OF THE PHILIPPINES– Discovery of a rich iron ore deposit has been reported in the Balankot-Dansolijon area of the Lumbia district, Mindanao. Construction of roads would be necessary in order to develop the deposit.

SOUTH AUSTRALIA–*South West Mining Ltd.* is exploring its leases which cover 2,000 square miles in northwestern South Australia and 7,000 square miles in Western Australia. The entire area is known as the *Mount Davies* nickel deposit. The terrain is extremely rough and considerable work would have to be done before any development could be undertaken. (For instance, a 300-mile railroad would have to be built.) Stockholders in South West Mining are *International Nickel Company of Canada* who owns 51 percent and *Nickel Mines of Australia, N.L.* who owns 49 percent.

REPUBLIC OF THE PHILIPPINES –If stockholders approve, *Balatoc Mining Company* will transfer all of its assets and liabilities to its sister company, *Benguet Consolidated Inc.*, in exchange for 1,200,000 shares of Benguet capital stock. At present, Balatoc's operations have not been profitable enough to meet the need for capital expenditures. Future prospects of Benguet are considered to be good because the company has been able to diversify its interests over the past few years by acquiring profitable chrome and lumber operations, and purchasing chrome and copper prospects.



Philippine Copper Concentrator Expansion

One of six 78-inch Wemco classifiers can be seen above as it is unloaded at Atlas Consolidated Mining & Development Corporation's Sangi concentrate loading pier on the island of Cebu, Philippines. This new equipment is part of a 5,000-ton-per-day plant expansion at the Atlas property. The six classifiers will operate in closed circuit with three 10-foot by 10-foot Marcy ball mills. In addition to the classifiers and ball mills, the plant expansion includes 40 66-inch Wemco Fagergren flotation cells which will bring total capacity for Atlas' Toledo mill to more than 10,000-tons-per-day of copper ore.

INTERNATIONAL

ITALY—Quicksilver exports during the first seven months of 1956 totalled 1,655 tons compared with 532 tons for the same period of 1955.

FRANCE—A promising deposit of uranium has been discovered in the Department of the Haute Vienne, near the Limoges. It is also close to Crouzille, where a uranium mine is already in operation.

WALES—*The Steel Company of Wales* struck a rich vein of iron ore after several months of exploratory drilling—some holes deeper than 1,000 feet—in Llanharry, South Wales.

ITALY—The July output from Italian steel furnaces was over 522,000 tons and pig iron production broke all records at 188,000 tons. Total production was 3,375,000 tons of steel for the first seven months of 1956 compared to 3,111,000 during the same period of 1955, an increase of 8.5 percent.

BELGIUM—*Forges de la Providence S.A.* of Marchienne-au-Pont has awarded contracts worth £200,000 to the Fraser and Chalmers Engineering Works for ore-blending, crushing, screening, and sampling equipment. Low-grade ore from the Briey district and imported Swedish ore will be handled by the plant, the densities varying from 1.6 tons to 3.2 tons per cubic meter.

SWEDEN—Iron ore shipments have been increased by the Swedish mining firm *Loussavaara Kiirunavaara Aktiebolag* through its expanded storing and shipping facilities at Narvik, Norway. The company has installed an automatic sorting machine in its new ore handling plant and now has a storage capacity for 2,500,000 tons of ore which will eventually be increased to 3,500,000 tons capacity. The Port of Narvik, which handled 9,000,000 tons of ore in 1955, is expected to handle more than 15,000,000 tons before this year is ended. Most of Sweden's iron ore shipments were made through Narvik this year because Luleaa, the North Swedish iron ore port, was hindered by hazardous ice conditions in the Gulf of Bothnia, and did not really get into full operation until July. Swedish iron ore exports during the first seven months of 1956 totalled 9,370,000 tons, as compared with 8,120,000 tons in the same period of 1955.

YUGOSLAVIA—Plans for expansion of the *Majdanpek* copper mines are making progress. It is reported that an agreement has been reached with a French group prvoiding $25,000,000 for the first stage.

WEST GERMANY—A large iron ore deposit has been reported in Lower Saxony. Preliminary drilling has indicated that the ore contains 25 to 30 percent iron and is of "neutral character" as opposed to the "acid" iron ore of nearby Salzgitter. It is anticipated that it would be 10 years before the project could be on a paying basis since plans call for sinking of a 3,000-foot shaft and construction of a 5,000-ton-per-day concentrating plant.

THE NETHERLANDS—Exploration for bauxite will be carried out on a "mu-

tual interest" basis by United States, German, Swiss and Dutch metal companies through a formal agreement for joint exploration. The companies are the *Olin Mathieson Chemical Corporation* of New York; the *Vereinigte Aluminium Werke A.G.* of Bonn; the *Aluminium Industrie Aktiengesellschaft* of Lausanne; and *N. V. Billiton Maatschappij* of The Hague. Specific areas of exploration have not been revealed.

IRELAND—*Silvermines Lead & Zinc Company Ltd.* has been tuning up its new heavy media plant. It is hoped that most of the difficulties will be eliminated shortly. At *Shallee*, further diamond drilled proved extensions of mineralizations on the property to the west of present workings. At *Silvermines*, drilling has also proved a lead-zinc deposit in dolomitic limestone, but the extent of this deposit has not yet been established. In addition to these developments, an outcrop of barite was stripped and a trial shipment of 400 tons was made.

NORWAY—Three mining companies—*Grong Gruber A/S*, *Fosdalen Bergverks-Aktieselskab* (iron ore), and *Storde Kisgruber A/S*, (pyrite)—will work together in the development of copper-pyrites from the *Gjersviken* mine in the Grong district. Output is expected to be about 100,000 tons per year.

WEST GERMANY—A 130-ton, electric-arc, steel furnace, built by *Demag* and claimed to be the largest in Europe, is now in operation. It has a maximum power consumption of 40,000 kva, the power used for one ton of steel being 410 kilowatt-hours. Capacity output is 40 tons per hour.

ITALY—A deposit of about 25,000,000 metric tons of potash was discovered at Serra di Falco in Sicily recently during the course of exploratory drilling at a nearby sulphur deposit.

ITALY—*Koppers Company, Inc.*, of Pittsburgh, Pennsylvania, will design and built a blast furnace for the Italian company *I.L.V.A., Alti Forni E Acciaieri D'Italia of Genoa.* I.L.V.A. is a subsidiary of *"Finsider"* which operates companies having a combined production of 60 percent of Italy's steel. The new blast furnace is the first step of an expansion program desigend to triple I.L.V.A. iron production. It will be installed at the Bagnoli plant near Naples and will have an output of about 1,200 metric tons of molten iron per day. The three furnaces now in operation, each producing 400 tons per day, will eventually be replaced by two the size of the new furnace.

UNION OF SOUTH AFRICA—The *Corner House* group (*Central Mining and Investment Corporation, Ltd.* and *Rand Mines Ltd.*) has acquired an option to purchase a substantial share of *Consolidated Chrome Corporation Ltd.* The option is conditional upon the results of an investigation of the latter's chrome deposits in the Rustenburg district of the Transvaal. Other interests of Consolidated Chrome are asbestos operations in Rhodesia, and lead deposits in South West Africa and the Transvaal, the latter being an indirect interest.

FEDERATION OF RHODESIA & NYASALAND—The *Johannesburg Consolidated Investment Company, Ltd.*, which recently was granted an exclusive prospecting concession in the Wedza Reserve in Southern Rhodesia, for three years, has appointed Sir George Davenport, former Minister of Mines, as its representative in the territory.

MOROCCO—*Societe Miniere de Bou Azzer et du Graara*, which operates a cobalt mine in the Great Atlas Mountains, reportedly will get state aid in building an ore concentrating plant in Casablanca. The company produces 7,500 tons of ore annually, all of which is exported. When the plant is completed, all of the ore will be concentrated by means of the chlorine process before export. The firm recently installed a new washing plant which necessitated the building of a 20-mile water pipeline. This new facility is expected to enable production to be increased from 7,500 to 10,000 tons a year.

UNION OF SOUTH AFRICA—*North Western Manganese and Copper Corporation Ltd.* has reported the location of a relatively small deposit of high-grade manganese ore and a considerable deposit of high-grade iron ore, close to Postmasburg station. A small monthly output of both ores is planned.

FEDERATION OF RHODESIA & NYASALAND—Work is progressing well at the *Mangula* mine which is said to be Southern Rhodesia's biggest copper mining project designed to produce 10,000 tons per annum by 1959. The *M.T.D.*

(*Mangula Company*, formerly *Rhodesia Copper Ventures*, is operating this project; *Messina (Transvaal) Development Company Ltd.* has an 82 percent in the firm. Messina is also closely connected with the plans being formulated for operation of the iron deposits at Bukwe in Southern Rhodesia.

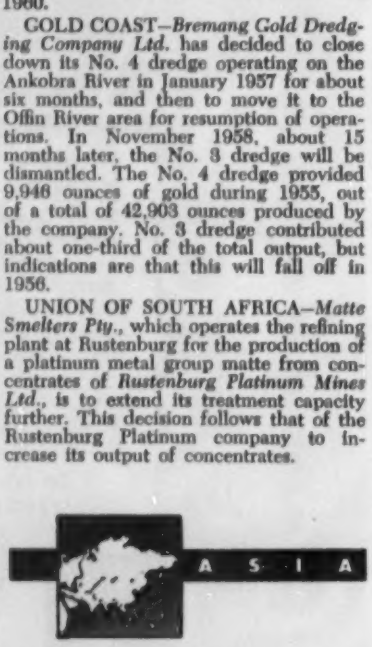
BELGIAN CONGO—A syndicate of leading Belgian financial interests has been formed to prepare plans for a large-scale aluminum plant in the Belgian Congo. This is part of an overall plan for using the potential reserves of electric power available on the Congo River at Inga, about 100 miles from the Estuary. It is calculated that the water, which at this point shows no seasonable difference in rate of flow, could be used for the installation of hydroelectric plant, capable of producing at least 20,000,000 kilowatts. The necessary bauxite would have to be imported from the Guiana coast but, from an economic point of view, this will not be a drawback because the advantage of the Congo and other African territories lies in the abundance of cheap hydroelectric power.

MOROCCO—The *Ouizan Company's* iron mines at Nador, are expected to produce 1,000,000 tons of ore this year for the first time in the firm's history. Improvements in handling and processing equipment will be responsible for the increase. Last year, *Nador* mines turned out 722,000 tons of ore with an average content of 64 percent iron and only 4.5 percent silica. Forty percent of last year's production went to Spain, 30 percent to Great Britain, and 16 percent to Western Germany. The open-pit mining is now completely mechanized, with loading done by electric shovels onto cars which take the ore to crushers. Some of the ore goes through grilling furnaces to burn out the 2 to 3 percent of sulphur it contains. The ore is then shipped by rail direct to the port of Melilla, 15 miles away. The railroad has been completely overhauled in the last 18 months and new cars have replaced defective rolling stock.

FEDERATION OF RHODESIA & NYASALAND—*Bancroft Mines* reports that three new drill holes gave high average copper values and two drill holes suggested the coexistence of cobalt with the copper. These holes have also indicated that the *Kirila Bomwe* orebody, on which the first stage shaft sinking has been completed, extends further than was first supposed, though it is too early for a tonnage estimate to be made about this extension. Bancroft comes into production early next year on the basis of about 42,000 tons of metal a year, and will work up to about 85,000 tons by 1960.

GOLD COAST—*Bremang Gold Dredging Company Ltd.* has decided to close down its No. 4 dredge operating on the Ankobra River in January 1957 for about six months, and then to move it to the Offin River area for resumption of operations. In November 1958, about 15 months later, the No. 3 dredge will be dismantled. The No. 4 dredge provided 9,946 ounces of gold during 1955, out of a total of 42,903 ounces produced by the company. No. 3 dredge contributed about one-third of the total output, but indications are that this will fall off in 1956.

UNION OF SOUTH AFRICA—*Matte Smelters Pty.*, which operates the refining plant at Rustenburg for the production of a platinum metal group matte from concentrates of *Rustenburg Platinum Mines Ltd.*, is to extend its treatment capacity further. This decision follows that of the Rustenburg Platinum company to increase its output of concentrates.



TURKEY—The *Newmont Mining Company* is doing prospecting in Turkey, particularly for copper deposits. *Tumas*, the mining company formed jointly last year by Etibank and Newmont, is doing geological studies and geophysical work at the old *Balya* mine. The Balya lead mine was shut down just before World War II because of the low prices prevailing at that time. The geophysical work consists of applying both resistivity profiling and pulse methods.

JAPAN—*Mitsui Mining & Smelting Company's* Shikama mill has been expanded and improved at a cost of about $555,555. As a result, daily capacity will be increased from the present 1,000 tons to 1,600 tons. The mill is located at the site of the *Kamioka* mine.

YEMEN—A Yemenite delegation recently conferred with Soviet officials in Moscow about the establishment of Soviet companies to explore uranium and petroleum deposits in Yemen. Preliminary investigations are said to have indicated the existence of uranium in the country.

TURKEY—Scheelite deposits containing up to 0.93 percent WO_3 have been found south-southeast of Keskin, which is east of Ankara. Thick layers of metamorphosed limestone are found over granite. Some drilling and exploration has been done already, and after more detailed geologic exploration, more investigations will be made. The deposit was located by systematic mapping by a German geologist.

JAPAN—*Dai-Nihon Mining Company* recently started copper smelting by converter. The company completed installation of the equipment in July. The system, reportedly the first of its kind in Japan, eliminates the blast furnace. Pulverized coal is blown directly into the converter in which the copper is to be melted. Recovery of lead and zinc contained in Kuromono ore (copper-lead-zinc ore) is expected to be improved by about 20 percent (Pb 90 percent, Zn 30 percent). The daily capacity is 30 tons.

INDIA—Over 700 Indian metallurgists will be trained in the Soviet Union in the next two years, according to the Russian news agency "Tass". At the Azovstal Zaporozhstal plants, 80 Indian technicians have already started training.

BURMA—For the nine-month period ended March 31, 1956, *Burma Corporation (1951) Ltd.*, jointly owned by *Burma Mines Ltd.* and the Union government, produced 83,848 tons of ore. Ore milled totalled 85,408 tons; refined lead totalled 11,942 tons; refined and Dore silver 1,085,673 ounces; copper matte 300 tons; nickel Speiss 327 tons; zinc concentrate (56 to 58 percent Zn) 10,692 tons. Net estimated profit for the nine months was £378,862.

JAPAN—Exploration work started last July by *Nippon Mining Company* on copper-molybdenum ore deposits in the Fujiwara area, Minakami-cho, Gumma Prefecture, (see MINING WORLD, August 1956, page 81) is already showing results. So far it has indicated that there is an estimated ore reserve of 20,000,000 tons of copper and 5,000,000 tons of molybdenum. Geographically, the area is wild, unexplored inland country, so the opening up of transportation facilities is particularly important to the development of the deposits. For this purpose, it is estimated that about $8,333,333, and about six years of work is needed.

CHINA—Phosphorus deposits, the largest ever found in China, were recently discovered in the southwest part of the country. Laboratory tests reportedly show that the ore contains 30 percent phosphorus. Prospecting started last year and is still continuing. This year's detailed surveys are said to be on a scale four times greater than last year.

MALAYA—*Ayer Hitam Tin* recently took its dredge out of operation for several months in order to make necessary repairs to the bucket ladder.

INDIA—Production of iron ore last year reached a new high with an output of 4,640,000 tons valued at 32,500,000 rupees, which was 10 percent higher than in 1954. Manganese output partially

recovered from the slump suffered in 1954 by producing 1,750,000 tons, 12 percent higher than in 1954. Output of gold dropped from 239,162 ounces to 210,880 ounces and silver from 17,199 ounces in 1954 to 15,425 ounces in 1955. Increases were reported for copper ore, limestone, chromite, gypsum, and ilmenite.

MALAYA—*Kent (F.M.S.) Tin Dredging Ltd.* reports that tin ore production during the current year has been at a reduced rate, because of lower grade ground treated and difficult conditions, but it is expected that this situation will change soon. The dredge is now set on a course to develop the lower lying ground farther south. An extensive drilling program has been carried out during the past few months in virgin ground in the southern section of the property as well as in the old dredge course which has been shown to contain some deeper mineralized zones below the maximum digging depth of the dredge. This comprehensive investigation is being continued until enough information is gathered for a final decision regarding modification of the dredge, or acquiring of another one should these deeper deposits prove worthwhile.

JAPAN—The *Kinoshita Shoten Trading Company* is investigating the possibility of developing new iron ore reserves in the Province of Orissa, India, to supply Japanese steel mills. The firm is said to be considering building a port at Paradip, about 50 miles east of Cuttack, to export ore from the *Shinda* mines in Orissa. If carried through, the plan would provide Japan with about 2,000,000 tons of ore annually.

PAKISTAN—The *Pakistan Atomic Energy Commission* has launched a large-scale search for radioactive minerals in the northern parts of West Pakistan. The groups, consisting of a geologist, a geographer, and a physicist, are from the University of Karachi. Cooperating with the AEC is the *Ground Water Development Organization* which plans to bore hundreds of tubewells in the area lying between Ravi and Chenab.

KOREA—The Taejon Mineral Assay Laboratory, built and equipped by the *United Nations Korean Reconstruction Agency* (UNKRA) to help Korea utilize its mining resources to its best advantage, has been formally turned over to the Ministry of Commerce and Industry of the Republic of Korea. All physical, legal, and operational control of the lab now belongs to the Ministry's Mining Bureau.

NORTH AMERICA

QUEBEC—*Kennecott Copper Corporation* has exercised its option to acquire a 51 percent interest in *Molybdenum Corporation of America's* rights in a columbium deposit at Oka, near Montreal. The option was entered into in August 1955. Exploratory work has confirmed the existence of a deposit of large tonnage, according to company officials, although problems relating to mining, processing, and marketing are still in preliminary stages of investigation.

BRITISH COLUMBIA—A 60-man crew with heavy machinery has completed more than half of an 8½-mile access road to the iron ore property of *Quatsino Copper Mines Ltd.* on the northern end of Vancouver Island. Shipments of 40,000 tons of ore monthly are scheduled to start in about nine months. the cost of road and wharf construction and mine preparation is estimated at about $3,000,000.

ONTARIO—*Willroy Mines* has completed its four-compartment shaft which has bottomed at 850 feet. A 1,000-ton plant is under construction at the base metal property in the Manitowadge area. Operation is planned for the end of 1957. The No. 3 zone is scheduled to be developed first. Shortage of miners has made it impossible to drift on all five levels simultaneously.

SASKATCHEWAN—*Potash Company of America, Ltd.'s* operations at Saskatoon moved from the exploration stage to that of development during the past year. Early in 1956 the ring of freeze holes at the selected shaft site was completed, the refrigeration compressors started, and freezing operations begun. Installation of the main sinking hoist, which is to be the permanent ore hoist, was finished, an auxiliary hoist for handling a special sinking stage was received and installed, and the permanent headframe erected and enclosed. A large concrete batching plant and mixers were set up, and the massive shaft collar poured. Actual sinking and lining with concrete were under way by

the year's end. It is to go to the 3,000-foot horizon. The company is now proceeding with development of a flow sheet and with the engineering plans for a proposed plant.

NEW BRUNSWICK—The *Canadian National Railways* is making good progress with construction of its new 22.9-mile branch line which will connect the *Heath Steele Mines Ltd.* with the CNR Bathurst-Newcastle line near Bartibog, New Brunswick. The line is expected to be in operation shortly. The mining company plans to ship 450,000 tons of lead, zinc, and copper concentrates over the line during the first six years of operation.

BRITISH COLUMBIA—*Granby Consolidated Mining, Smelting and Power Company,* which is building a 500-ton mill at its reopened *Phoenix* mine near Greenwood, has set up a new firm to conduct the operations. *Phoenix Copper Company* is the firm and Granby purchased 1,000,000 shares at 10¢ per share, plus a subsequent 500,000 shares at 20¢, under an option covering 1,000,000 shares at that price and extending until August 31, 1957. Granby also has another option to take 950,000 shares at 30¢ until August 31, 1958. *Attwood Copper Mines* was issued 50,000 shares.

NEW MEXICO—*Indian Lake Mines Ltd.* has acquired a 120-claim copper property in Socorro County, New Mexico (The company is controlled and managed by *Newkirk Mining Corporation* of Toronto, Ontario). Diamond drilling reportedly indicated 357,000 tons of ore in one area averaging 3.0 percent copper. Drilling to determine the size of the ore body is continuing.

BRITISH COLUMBIA—*St. Eugene Mining Corporation,* in which *Frobisher Ltd.* has a substantial interest, made its first shipments from its *Maid of Erin mine* which has been brought into production this season. Indicated ore reserves are estimated at about 35,000 tons grading 8 percent copper and 18 ounces of silver per ton.

OHIO—The *Youngstown Sheet and Tube Company,* one of the organizers of *Iron Ore Company of Canada,* expects to receive 1,000,000 tons of iron ore from the Labrador operation before the end of this year. Last year the company received 584,000 tons.

BRITISH COLUMBIA—An underwater mining operation started this summer a short distance offshore from COMINCO's *Bluebell* mine at Riondel, on Kootenay Lake. The ore, a large deposit of mill tailings which were run into Kootenay Lake from the old Bluebell operation of 25 to 50 years ago, lies under water varying in depth from 75 to 400 feet. Modern technology has made possible the economical recovery of zinc from the once worthless tailings. To raise the shallower tailings from the lake bottom, an air-lift is being used. The equipment is operated by *Inland Dredging Company* from a barge anchored in Bluebell Bay. Deeper deposits are expected to be raised with a clam-shell. The salvaged tailings, resembling ordinary gravel in consistency, are treated at the Bluebell Mill along with normal mine ore production. The concentrates are shipped to COMINCO's plants at Trail.

ALASKA—Four copper ore deposits have successfully passed metallurgical test conducted by the Bureau of Mines in its laboratory. The tests indicated that ore from these deposits could be treated by standard methods to produce com-

mercial grade copper concentrates. Lab studies were made of samples from the *Moth Bay* mine on Bevillagigedo Island; *Threeman* mine in the Port Fidalgo area; *Golde Zone* mine near Colorado Station; and the *Kathleen-Margaret* prospect on the MacLaren River near Paxon. Copper recoveries, using standard flotation techniques, ranged from 79 percent for the Moth Bay ore to more than 95 percent for the sample from the Kathleen-Margaret. From the Kathleen-Margaret also came the highest grade concentrate, assaying 36.7 percent copper.

MANITOBA—Field crews of *Combined Developments* are now exploring 36 claims in central Manitoba which are thought to contain copper. Geophysical work is also planned on a 55-claim property at Aspen Grove, British Columbia also possibly copper-bearing.

GREENLAND—Members of a Danish geological investigation have reported a new lead discovery in northeast Greenland about 50 kilometers from the lead mine now being developed by *Nordic Mining Company* at Mestervig.

MEXICO—*International Hermes, S.A.* has taken control of the *Vicente Guerrero* mercury mine located at Huahuaxtla, municipality of Taxco, 12 miles northeast of Iguala, state of Guerrero. The company has made arrangements with the *Mexican Light & Power Company* to supply 350 kilowatts for which they will provide the installation of a 6,000-volt transmission line a distance of three miles. The firm is also installing a 50-ton Gould rotary furnace which will be in operation shortly. The average content of the ore is 9 kilos of mercury per ton.

BRAZIL—Dr. Elysiario Tavora Filho, chief of the Brazilian group of geologists interested in the discovery of uranium mineral deposits, declared recently that uranium ore possibly can be mined in the coal mines in the southern part of the country. The first studies showed that the uranium content in coal varies from 0.002 percent up to 0.16 percent.

BOLIVIA—*Sociedad Minera e Industrial* is making plans to mine its two large deposits of iron ore (lump ore type with a 68 percent iron content) known as the *Santo Domingo* and *La Favorite* mines. The deposits are said to have a reserve of 200,000,000 tons, and are located 45 kilometers from Sucre City. Plans are to export to the United States, Europe, and Argentina, and also to install a blast furnace for production of iron and steel to supply the local markets of Bolivia. In the future, it is also planned to export pig iron to Argentina.

CUBA—President Fulgencio Batista has signed a decree declaring gold to be a "national utility and public necessity." This includes "the development, extraction, treatment (refining), smelting, packing, and transportation" of the mineral. All persons having mining claims must put them to work within six months after being so required by the National Bank or Stabilization Fund. Otherwise, the mines may be taken over by the National Bank, and a six percent royalty will be given the concessionaire. Purpose of the decree is to develop the production of gold, not only to help that phase of the mining industry but also to increase the nation's monetary reserves.

PERU—*Cia. Minera Palca S.A.* has prepared a program of exploration for copper, lead, and other minerals in several areas of the southern provinces of Carabaya, Azangaro, and Melgar. The company also plans to start production from its already developed mine in the province of Lampa.

MEXICO—*Pan American Sulphur Company* reports that through August of this year production amounted to 360,000 tons of sulphur. Estimated production for the remainder of the year will be about 2,000 tons daily, bringing total annual production for 1956 to 600,000 tons. The management expects its new facilities will raise total annual capacity to around 1,000,000 tons. The firm is building a $5,000,000 sulphur processing plant at Jaltipan in southern Vera Cruz.

BRAZIL—Since the beginning of the year, *Brassinter S.A. Industria e Comercio* of Sao Paulo has been manufacturing hard tungsten carbide bits under a technical assistance agreement with *Firth Sterling Inc.* of Pittsburgh, Pennsylvania. The firm reports it is using a complete chemical plant for treating Brazilian scheelite ore for the first time in Brazil.

VENEZUELA—*Western Paving Construction Company* of Denver, Colorado is reported to be investigating an open-pit iron deposit in Venezuela which is similar to the *Cerro Bolivar* iron deposit. A railroad would have to be built to the property. Reserve is reportedly sufficient to handle an output of about 7,000,000 tons annually for 20 years.

MEXICO—*Cia. Metalurgica S.A.* has been investigating the mercury mining district of El Cuarenta, located in the municipality of Santa Maria del Oro, State of Durango, where the firm has several claims. This district started producing in 1940, but was shutdown after World War II because of the drop in mercury prices. The mine foreman for Cia. Metalurgica reports that the firm's mercury production will be increased because of the recent development of new sources of cinnabar ore.

CHILE—Since the government has passed better legislation for its mining industry, the large United States copper companies operating in Chile have substantially increased their production. *Anaconda Company* subsidiaries—*Andes Copper Mining Company* and *Chile Exploration Company*, respectively—have raised output at *Potrerillos* from an average of 3,100 tons monthly in the first quarter to 3,450 tons in the second quarter and at *Chuquicamata* from an average of 18,000 metric tons in the first quarter to 19,500 tons in the second quarter. *Braden Copper Company*, a *Kennecott Copper Corporation* subsidiary, increased its output at the *El Teniente* mine from an average of 12,350 tons monthly in the first quarter to 14,000 tons monthly in the second quarter.

MEXICO—Existence of uranium near Torreon in the state of Coahuila has been proven by a series of tests carried out with Geiger counters, according to Armando Valdes, head of the Torreon mining office. Development will be held up at least until next year when the Federal government is expected to define its policy on radioactive minerals. At present, their sale and exportation is forbidden.

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of MINING WORLD published monthly except in April when publication is semi-monthly, at Bristol, Connecticut for October 1, 1956.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher—Wm. B. Freeman, 121 Second Street, San Francisco 5, California; Editor—George O. Argall, Jr., 121 Second Street, San Francisco 5, California; Managing Editor—None; Business Manager—Max F. Holsinger, 121 Second Street, San Francisco 5, California.

2. The owners are: American Trade Journals, Inc., 121 Second Street, San Francisco 5, California; Miller Freeman Publications, Inc., 121 Second Street, San Francisco 5, California; Wm. B. Freeman, Miller Freeman, Jr., 121 Second Street, San Francisco 5, California; L. K. Smith, W. E. Crosby, 71 Columbia Street, Seattle 4, Washington.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circuumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

WM. B. FREEMAN, President (Publisher)

Sworn to and subscribed before me this 1st day of October, 1956.

(SEAL) Barbara M. Hampson, San Francisco, California

My commission expires February 18, 1958.

VENEZUELA—Government geologists report they have found commercially feasible deposits of bauxite in southern Venezuela. One deposit alone is estimated to contain about 10,000,000 tons, assaying 40 percent aluminum oxide content, a small amount of silica, and 27 percent iron oxide.

PERU—*Cerro de Pasco Corporation*, which moves about 1,000,000 tons per year by railway between Oroya (location of the smelter) and Callao (main Peruvian port), is currently considering ways of reducing transportation costs. Two United States experts are making a comparative study of the present system versus trucking, or a combination of both. The railway is operated by *Peruvian Corporation*, an independent firm. Any decision made by Cerro de Pasco will, of course, affect the situation of the Peruvian Corporation and the transportation picture for all mines and producers in this Central Andes region.

CUBA—The *Jeanette Minerals Ltd.* of Toronto, Canada is reported to be buying up options on mineral rights in Cuba. The firm's president, Harry Hands, is reported to have said that his company was acting after a favorable study of Cuban mineral deposits by W. W. Beaton, a Canadian mining engineer.

MEXICO—*H. F. Shiffer Associates Inc.* of Los Angeles, California have taken a six-month exploratory option on three nickel properties in the Culican district of Sinaloa state. The company's geologic crew had been working in the state of Sonora but has reported unfavorably on the property it was investigating and has moved to the Sinaloa area. Steve Chiapella is in charge of the new operation.

HAITI—Control of *Nu-Age Uranium Mines* has changed hands and the new operators have changed the company company name to *Haitian Copper Corporation* in keeping with the firm's most recent activities on a 24-square mile concession in Haiti. The company also has numerous mineral prospects in Canada.

BOLIVIA—The Bolivian government is reported to have reorganized the *Corporacion Boliviana* which controls the nationalized mines. Chairman of the new board is Raul Gutierrez Granier, a former official of *Patino Mines*.

CHILE—*Compania Mineral Santa Fe's* iron ore production is expected to reach the volume of the Brazilian *Rio Doce* mine in the near future since its mechanization program is under constant development. Santa Fe is the largest open-hearth ore supplier in Chile, with an affiliated company, *Comapnia Minera del Pacifico*, controlling several deposits, mainly as outright properties, and some partly under lease on a royalty basis. Santa Fe operates mine in the Ovalle area, south of the port of Coquimbo, production of which is shipped to the major United States steel mills. The second part of Santa Fe's operation comprises the *Los Cristales* and *Pleito-Zapallo* mines north of La Serena. This production also goes mainly to the U.S. The third operation is related to the Caldera port in the Copiapo area where they control several mines, and the fourth part of their operations is in the Chanaral area through the port of Chanaral. The company has planned the building of mechanized ports which will facilitate the loading and increase their production in these areas.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

World's Largest Trussless Steel Roof Tops Building

The erection of the world's largest trussless steel roof—a clear span 120 feet wide and 260 feet long—over the new $¾ million Phoenix Coliseum under construction in Phoenix, Arizona, was announced today by the Wonder Building Corporation of America.

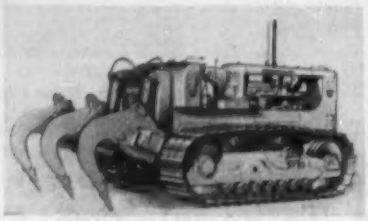
Called the "Wonder Roof," it is the first in a new line of low-cost, long-span custom-engineered roof decks being marketed by the firm. Ideal for mill buildings, costs are said to be one-third less than conventional roof structures. The roof consists of curved 18-gauge corrugated steel sheets, two feet wide and from six to ten feet long, fastened together by nuts and bolts to form self-supporting arches. The trussless design eliminates the need for pillars, posts, purlins, or supports of any kind. Although less than 1/16-inch thick, the steel roof will withstand winds in excess of 113 miles per hour, and will support loads up to 42 pounds per square foot. Circle No. 72 for further information on this outstanding product.

New Soft Plane Tires For Rough Landing Areas

The Goodyear Tire & Rubber Company has developed a new low-pressure pneumatic aircraft tire for landing, and taking off in marginal landing areas. The new barrel-shaped Terra-Tires signal greater safety for pilots confronted with the hazards of getting their aircraft in and out of unimproved areas.

Advantages of Terra-Tires over conventional airplane tires is that their thin, extremely pliable walls, combined with extremely low pressure, enables the tires to absorb or conform with uneven surfaces without resisting them and to glide over soft "giving" surfaces without bogging down.

Axle-driven Terra-Tires are also being used on trucks, trailers and other off-the-road vehicles. Circle No. 66 for further information.



New Cat Ripper Features Increased Maneuverability

A new tractor-mounted ripper designed specifically for use with the Caterpillar D9 Tractor has been announced by Caterpillar Tractor Co. It will be called the No. 9 Ripper. Increased maneuverability, better control of ripping depth, and extreme utility are the important features of the new ripper. The complete ripper consists of two mounting brackets, two hydraulic cylinders, one beam assembly, and three teeth. It weighs 10,830 lbs.

The No. 9 Ripper mounts on the bevel gear case through a special drawbar bracket group which replaces the standard drawbar brackets. The ripper is operated hydraulically by two hydraulic cylinders working in conjunction with the Caterpillar No. 50 Hydraulic Control. The convenient hydraulic controls give the operator good control of the ripping depth which can go down to 28 inches. For further information circle No. 80.

Portable Welding Machine For Manganese Steel

A portable welding machine designed specifically for manganese steel and hard-facing work on irregularly-shaped parts is being made available to industry after two years rugged field testing in construction, the Amsco Division of American Brake Shoe Company announced recently.

The MF Welder, mounted on large casters, is designed to plug into conventional ac or dc welding units by a single cable. The unit operates on a current range of from 150 to 450 amps.

As an accessory in the relatively new field of hardfacing, the MF serves as a semi-automatic device for feeding flux-coated welding wire to parts of machines, or implements, being "re-treaded" with new metal after original surfaces have worn away. The welder features a self-feeding mechanism for keeping the welding arc constantly supplied with welding wire, at a rate exactly and instantly proportional to the size of the arc. Circle No. 70 for further information.

Self-Propelled TRACDRIL For Rugged Pit Work

The new Chicago Pneumatic G-800 TRACDRIL is designed to speed-up open-pit drilling. An independent drilling unit that tows its own air supply, the TRACDRILL mounts a powerful 4-inch CP drifter. The self-propulsion feature and a drill carriage that is elevated and lowered hydraulically makes hole spotting and drilling a one-man operation.

The unit is powered by two 6 hp. Power Vane motors that enable the TRACDRIL to move forward or backward, or pivot at a touch. The unit develops sufficient tractive effort to tow a 13,000 pound compressor up a 10% grade. It will travel over rugged terrain—even up muck piles. A 4-page brochure (SP-3192) is available to interested readers. Circle No. 78.

HOSE COUPLING CATALOG: A new catalog recently published by the Hose Accessories Company is now available for you. The brochure features the complete line of Le-Hi Hose Couplings, Clamps, Nipples, Valves, and Manifolds, for the mining industry. Circle No. 1 for your copy.

ELECTRIC EAR: Hardinge Company has recently released a new brochure featuring its "Electric Ear" grinding mill feed control. This is an electronic device which automatically regulates the flow of feed material, wet or dry, to a continuous grinding or pulverizing mill based upon the grinding sound level. Circle No. 2 for your copy of this interesting booklet.

CALCITE FLOTATION: The Denver Equipment Company has published a Flowsheet Study describing the beneficiation of Calcite by Denver "Sub-A" Flotation. It also compares the flotation of impurities such as graphite and/or pyrite with flotation of Calcite where other impurities are depressed and discharged as tailings.

POCKET THEODOLITE: The Wild T-12, offering a combination of light weight, miniature size, and man-size work potential, is considered an ideal instrument for preliminary and smaller survey work of all types. The instrument has an over-all dimension of less than 3 inches by 8 inches, including its metal cylinder container. For further information on this 7 pound instrument, circle No. 3.

FLOTATION CHEMICALS: The properties, application and advantages of cationic chemicals in flotation are described in a new booklet prepared by the Chemical Division of Armour and Company. The booklet contains concise and factual information on cationic flotation. Circle No. 4 for your copy.

RUGGED AIR HOSE, now available from the Gates Rubber Company, insures long life under the most severe conditions. This new wire-reinforced, oil-proof drill hose, is rated far in excess of normal working pressures. The hose is highly kink-resistant, and is available in sizes from ½-inch ID to 2-inches. Send for your free hose catalog, and get the full story. Crcle No. 5.

PROFITABLE EARTHMOVING is the subject of a new brochure published by the Caterpillar Tractor Company. The booklet points out that there is a bulldozer designed for all track-type tractors in the Caterpillar line. Send for your copy, circle No. 6.

SCINTRAN: A series of all-transistor scintillation detectors for uranium, oil, and gas exploration, supplements La Roe's line of detectors for portable, mobile, and airborne use. This fully field-tested series of instruments have many novel features, among them being battery life of up to two years. For further information circle No. 7.

FASTER DRILLING SPEEDS are being realized with the newly modified Le Roi-Cleveland H-10 sinker drill, as well as a stronger, faster rotation. The change incorporates the use of a new valve, which assures faster drilling speeds in both hard and soft rock. For further information circle No. 8.

NEW MOTOR SCRAPER: Allis-Chalmers is introducing its new TS-260 Motor Scraper, a 200-hp unit weighing approximately 39,600 pounds. It is powered by a six-cylinder Allis-Chalmers Diesel engine. With its 14-cubic yard heaped capacity, the TS-260 is rated for high production in this medium sized scraper. Circle No. 9 for further information.

TAME UNRULY EARTH permanently and economically with Armco's new bin-type retaining walls. The unique design of the Armco Bin Wall overcomes unequal settlement, eliminates loss of fill material and simplifies construction. Concise, helpful data on Armco Bin-Type Retaining Walls are given in a new brochure available to you by circling No. 10.

SUSPENSION HOPPER SCALE: Cumulative weighing from either a series of feeders or a single hopper is possible with a new, automatic suspension-type hopper scale, according to the Richardson Scale Company. The scale can be used for batch weighing with a suitable feeding arrangement. Circle No. 11 for further information.

CRV PUMP BULLETIN: A new bulletin covering the complete line of class CRV crade-mounted centrifugal pumps has been announced by Ingersoll-Rand. Pumps described have capacities from five to 2800 gallons per minute and pressures of ten to 525 feet toeal head. Circle No. 12 for your copy.

WELDING REGULATORS: The Air Reduction Company announces the availability of a new line of low-priced, inverse-type oxygen and acetylene pressure regulators, they are designed to meet the needs of the smaller metal fabrication shops where initial costs are a factor. Circle No. 13 for further information.

A NEW TYPE RIPPER, designed especially for speeding up bucket loader operations, has been developed by Hensley Equipment Company. Cast of special alloy moly-manganese steel, the new Hensley Bucket Loader Ripper clamps directly to the lower lip of any standard bucket loader, enabling operator to rip and loosen dirt for faster loading. Circle No. 14 for more details.

EXHAUST SCRUBBER: The Johnson-March Corporation has developed a new dust control unit that removes microscopic solids, fumes and odors from exhaust gases at 99 per cent efficiency. It can be used anywhere impurities are encountered of extremely low and even submicron size particles. Circle No. 15 for more data on this efficient scrubber.

HYDRAULIC SYSTEMS: A new 20-page illustrated catalog is now available for you from Vickers Incorporated, describing oil-hydraulic systems and components for all mobile equipment. The catalog describes all phases and types of hydraulic systems available from Vickers. For your copy circle No. 16.

NEED A CRANE, Winch, Dump-Bed, A-frame, or Tail-Gate Loader? Investigate the possibilities of a Hiab versatile crane combination. This truck mounted crane combination has a turning radius of 180° and has capacity up to 5000 pounds, and as a ground drag winch, 7000 pounds. Accessories include clamshells, drag line scoops, boom locks and other devices. Available from Scaco Mfg. and Sales Inc., you can circle No. 17 for more information.

NEW TUBE RODS available from Amsco, feature longer wear life of parts, high deposition of alloys plus speed and ease of welding. The rods are designed specially for semi-automatic hardfacing. The new electrodes are 5/64-inch diameter drawn tubular wire and act much like mild steel solid wire in the welding machine. Circle No. 18 for details.

SWINGING DRAWBAR: A new swinging drawbar attachment for No. 955 Traxcavators has been announced by Caterpillar Tractor Co. Designed to give the

---

Circle numbers and mail this card for free product literature

→

to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

PLEASE PRINT

This card may also be used to subscribe by filling in here

→

See other side for subscription rates

NOVEMBER 1956 — **NOT GOOD IF MAILED AFTER JANUARY 25**

FILL IN NUMBERS OF ITEMS YOU DESIRE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Also send further free information on the equipment advertised on pages:

..... Product ..... Manufacturer .....

..... Product ..... Manufacturer .....

Name ..... Title .....

Company .....

Address .....

Use this section to subscribe only

☐ New Subscription

☐ Renewal

☐ 1 yr. $3

☐ 2 yr. $5

Name ..... Title .....

Company .....

Address .....

No. 955 all the drawbar versatility of the D4 Tractor, it can be used on the No. 40 scraper or any other piece of towed equipment. Circle No. 19.

"THE OPEN DOOR to Lower Operating Costs" is the subject of a new brochure published by Sturtevant Mill Company. According to the company these lower operating costs are made possible through the utilization of Sturtevant Dry Processing Equipment. The open door feature of all this equipment is that vital parts to all machines are accessible by "one man in one minute." Circle No. 20 for further information on this cost-cutting equipment.

HYDRAULIC RAMP HOIST: A new hydraulic ramp hoist for trucks is now available from the Schwartz Mfg. Company. The Schwartz hydraulic platform ramp hoist converts for ramp loading, and also may be used as a truck hoist with a 40° dump angle. Circle No. 21 for further information.

WINCH CATALOG: Gar Wood Industries has available for you a new catalog describing their full line of both truck-mounted and stationary winches. Single and double-drum winches, ranging in capacity from 7000 to 100,000 pounds are fully illustrated and described. Circle No. 22 for your copy.

FRONT-WHEEL LOCKING HUB sets and attaching parts are now available for three four-wheel-drive International trucks in the light and medium-duty fields. These are the International models S-120 (4 by 4), S-140 (4 by 4), and S-160 (4 by 4). For further information circle No. 23.

CAT ELECTRIC SETS for Power and Protection is the title of a new 16-page booklet published by Caterpillar Tractor Co. The booklet shows many of the different kinds of uses to which these versatile power plants can be put, and some of the reasons why they are especially well suited to the applications. Circle No. 24 for your copy.

DRAGLINE BUCKETS: A line of completely new dragline buckets, offered with either solid or perforated baskets, has been announced by Bucyrus-Erie Co. Three types are available—the BL for light-duty digging; the BM for medium-duty digging in bulky materials; and the BH for heavy-duty digging conditions. Circle No. 25 for further information.

NEW DRUM SEPARATOR: Stearns Magnetic Inc., recently announced the development of a new wet drum magnetic separator. Called the "WPD," the separator is a powerful wet drum magnet unit designed for efficient recovery of media in heavy density plants. Circle No. 26 for additional information.

CHEMICAL CATALOG: A new 20-page booklet describing briefly the complete line of Mathieson chemicals for industry has been issued by Olin Mathieson Chemical Corporation. The brochure covers the company's organic, inorganic, and specialty chemicals, with descriptive information on each type. Circle No. 27 for your free copy.

AERIAL SURVEY NEWSLETTER: Hycon Aerial Surveys has recently issued its first monthly newsletter, containing up-to-date information on latest developments in airborne geophysical instrumentation and methods. This interesting and informative newsletter is available to you by circling No. 28.

PUNCH-LOK CATALOG: A new condensed catalog on hose clamps, locking tools, fittings, accessories and how-to-order information has recently been released by Punch-Lok Company. Also illustrated and described is a Clamp-Master Kit consistings of an assortment of 45 standard Punch-Lok clamps and locking tool. Circle No. 29 for your copy.

TRAVELING FILTER: Dorr-Oliver Incorporated announces the availability of a new brochure entitled "Dorr-Oliver Traveling Pan Filter." The booklet describes the unique features of this filter which is essentially a series of individual filter pans mounted on an endless rubber belt driven by sprockets. Circle No. 30 for your copy of this interesting booklet.

BECKMAN PROCESS BULLETIN: Now available from the Scientific Instrument Division of Beckman Instruments Inc., is a new bulletin describing their line of process instruments. Included are descriptions of their Electrolytic Hygrometer, Infrared Analyzer, Leak detector, and many others. Circle No. 31 for your copy.

CENTRIFUGAL DUST COLLECTOR: A new bulletin on the recently developed Cyclo-trell multiple tube dust collector has been issued by Research-Cottrell, Inc. The Cyclo-trell operates on centrifugal collection principles and incorporates new design features to boost collection efficiency and gas handling capacity. Circle No. 32 for your copy.

BELTING STRONG AS STEEL: A new nylon-filled fabric which according to the manufacturer is as strong as steel cable provides the muscle for a conveyor belt construction announced by B. F. Goodrich Industrial Products Company. A belt made with five plies of the new "Nyfil 120-RS" fabric is as strong as a steel cord belt rated at 1,000 pounds per inch per ply. Circle No. 33 for further information on this new belt material.

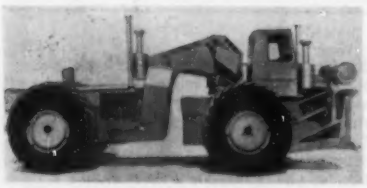
CENTRIFUGAL AIR WASHER: A new model of the Ducon Centrifugal Air Washer, the UW-4, which is ideally suited to a wide range of applications in the field of industrial dust control and recovery, is announced in a new brochure published by the Ducon Company. Circle No. 36 for your copy.

NUCLEAR ENERGY MATERIALS summary has just been completed by Uranium Information, Box 2612, Denver, Colorado. Of particular interest is the company-by-company review of significant operations during the last 12 months. There is also an activity review of districts in 17 states. Government activities, financial mergers, DMEA contracts etc. are also covered. Send $7.50 to Uranium Information at the above address for a copy.

A RHYTHMIC BEAT to screen more tonnage with less power has led to the development of a new vibrating screen by Hewitt-Robbins. Called the hi-G screen it has unique anti-blinding, and anti-plugging qualities. Circle No. 45 for brochure describing this new screen development.

MICHIGAN TURBO-DOZER: A new brochure prepared by Clark fully describes the new Michigan Turbo-Dozer. Action photographs and detailed descriptions outline the full capabilities of this unit. Circle No. 47 for your copy.

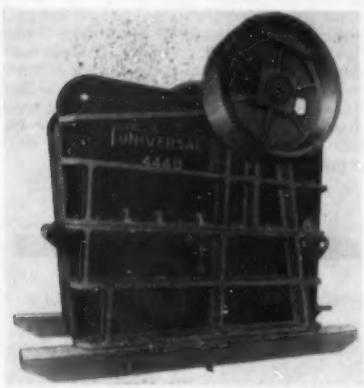
DUST COLLECTION: Collection of all types of dust, including sub-micron particles, and recovery of valuable materials are handled efficiently and economically with the Johnson-March Type A Hydro Precipitator Scrubber, which accordieg to the manufacturer can provide efficiencies as high as 99 percent plus. For further information circle No. 48.



Powerful Tractor Built For Pushing Scrapers

Containing a total of 416 hp, a big new two-engine tractor just introduced by LeTourneau-Westinghouse Company has according to the company become the biggest, fastest, most powerful tractor in the world. Designated as the Model Twin-C, it weighs more than 40 tons and is capable of speeds up to 20 mph.

More than four years in development and testing, the new rubber tire giant is designed primarily to push load the larger self-propelled scrapers which have come into common use during the past year. Dynamometer tests show that on a footing of sandy clay the Twin-C weighing 81,524 pounds, in first range, has recorded a drawbar pull of 65,900 pounds. Dual engine power is completely synchronized with air and electric controls making the Twin-C extremely easy to operate. Circle No. 57 for the full story on this newly developed giant.



Jaw Crusher Believed Largest In Production

Universal Engineering Corporation announces production of the 4448 "WRB" Overhead Eccentric Jaw Crusher. Believed to be the largest overhead eccentric jaw crusher in current market production, the Universal 4448 possesses these design features: stress-relieved, welded steel base; extra-long jaws, stationary—102-inches, movable—115¾-inches; spherical, self-aligning bearings, hydraulically removed; rocker-type steel toggle plate, steel-plated shims and hydraulic cylinders.

Approximate capacities range from 200-350 tons per hour at a 4-inch discharge opening to 800 to 950 tons per hour at the maximum 12-inch opening. Circle No. 71 for further information and brochure.

Electrical Testing Unit Has Overload Protection

This greatly improved and more versatile Martindale V.A.O. Tester Model 455 has as its outstanding advancement a patented automatic overload protection system. Accidental overloads will not burn out the meter or the internal circuits but will open the input circuit instead. Meter sensitivity is 20,000 ohms per volt on all ranges, both A.C. and D.C.

Instrument housing is insulated, unbreakable, and resistant to shock and acids, the large five-inch meter is covered with clear chip-proof lucite and is easy to read. Circle No. 79.

Heavy-Duty Wagon Drill Weighs Only 1,500 Lbs.

The DR40 heavy-duty wagon drill, made by the Le Roi Division of Westinghouse Air Brake Company, is light in weight for maneuverability in rough terrain. It is designed for vertical or horizontal drilling in hard formations.

The D14DR drifter, recommended for use with the new wagon drill, is used with a 13-foot feed shell mounted well behind the center line of the wheel axles. A chain take-up adjustment assures smooth feed throughout the 10 feet of feed travel. For further information, circle No. 74.

Roof Bolt Capable of Holding 40,000 lb. Pull

Capable of sustaining a 40,000 pound pull-out in hard rock, a ⅝-inch steel rock bolt with a forged anchoring head and expansion shield is now being made available by Republic Steel's Bolt and Chain Division.

The bolt has passed tests in Republic Steel's own mines for pull-out registering 10,000 pounds more than the showing of slotted type bolts and square head type bolts with expansion shells. The anchoring end of the bolt has a wedge head and shield; the exposed end is roll threaded. It can be obtained in stock lengths from two to eight feet, or can be made on order to any specified length.

The forged wedge head type bolt is available in either high or low carbon steel and is suitable for installation in stoper driven or auger drilled holes. Circle No. 68 for further information.

Notes From The Manufacturers

The Hyster Company plans to open a new tractor equipment assembly plant near Glasgow, Scotland. The plant will supplement Hyster's manufacturing plant established in Nijmegen, The Netherlands, in 1952.

W. P. Blanchard has been elected vice president and general manager of Yuba Manufacturing Company at Benicia, California. He will also have direct responsibility for the company's C & D "Movall" division at Perkins, and Stockton Iron Works at Stockton, California.

George D. Becker is the new special design consultant for the crusher division of Nordberg Manufacturing Company, Milwaukee, Wisconsin.

LeTourneau - Westinghouse Company, earthmoving and material handling equipment manufacturer of Peoria, Illinois, has begun a $9,000,000 building and tooling program. The first step is the construction in Peoria of a 300,000 square foot modern factory building.

Dorr-Oliver Incorporated has expanded its field engineering division as a function of the newly established sales services department. Field engineers have been assigned to territorial areas generally coinciding with the Dorr-Oliver sales divisions. William F. Werner, Jr. has been named to supervise the south eastern territory from Atlanta and J. Otto Veach is resident supervisor of the south central territory at Dallas.

P. O. Peterson, president of Mack Trucks, Inc., announced recently that his company has purchased the Brockway Motor Company truck business.

Hycon Aerial Surveys of Pasadena, California expects to open overseas sales offices soon in Alepo, Syria, for the Near East; in Paris and Frankfurt for Europe; Algiers and Tunis for North Africa sales.

J. M. Bryant, chief engineer of Link-Belt Company's Indianapolis ball and roller bearing plant, was one of a four-man delegation on bearings to the International Standards Organization meetings in Vienna during September. The other members were Gunnar Palmgren, vice president in charge of engineering, SKF Industries, Inc.; Harry Slusser, standards engineer for Timken Roller Bearing Company; and Harry O. Smith, secretary-manager of the Anti-Friction Bearing Manufacturers Association.

Wooldridge Manufacturing Division, Continental Copper & Steel Industries, Inc., is opening a complete Wooldridge factory parts warehouse at Melrose Park, Illinois to back up the parts stocks of Mid-West Distributors of the Wooldridge Complete Scraper Line.

Aero Service Corporation, of Philadelphia, has added a Sikorsky S-55 helicopter to its aircraft fleet to broaden the company's service to the mining industry. It will be used for conducting detailed airborne exploration in the search for ore bodies beneath the earth's surface.

Arizona Mines Consolidated, Inc. of Casa Grande, Arizona, is continuing to operate its manganese property on the Papago Reservation and is shipping under the government's carlot program. The holdings, known locally as the *Stella Mavis*, are about 46 miles southwest of Casa Grande. Donald Wenger of Casa Grande, is foreman at the mine.

Inspiration Consolidated Copper Company has entered into an agreement with *Callahan Zinc-Lead Company, Inc.*, for a program of deep drilling on the *Seventy-Nine* lead-copper mine near Winkelman, Arizona. The Seventy-Nine has been a small and intermittent producer of lead and copper ores for many years. It was acquired by Callahan Zinc-Lead in 1950, and since 1952 has been worked in a small way by *Grissom Mines, Inc.* The agreement gives Inspiration an option to purchase.

The *Ambrosia Minerals, Inc.* (George A. Mellen of Albuquerque, New Mexico, president) reports that its Aguila, Arizona, property is producing at the rate of one carload of 43 percent manganese concentrates daily. The ore comes from the company's *Purple Pansy* group, is treated in its sink-float plant at Aguila, then sintered by *Mohave Mining and Milling Company* at Wickenburg. The firm also has acquired the *Black Queen* mine near Aguila, where work will start shortly, and is making plans for a second mill so production can be stepped up to two carloads daily. The present mill was secured from the *Herald Mining Corporation* of Arizona early last summer and moved from Bouse to Aguila.

Kennecott Copper Corporation has set up a meteorological survey at its Ray, Arizona operations to determine the height and design of the stack for the new smelter to be constructed at the Hayden plant. A portable sulphur dioxide analyzer is used to determine the sulphur dioxide concentration from the surrounding areas.

The *Banner Mining Company* of Tucson, Arizona, is planning to complete the enlargement to its mill within the next month, at which time the plant will have a daily capacity of 1,000 tons. The mill enlargement is one phase of the exploration, development, and expansion program on which Banner is spending in excess of $1,000,000. At present, the company is employing 270 men, and when the expansion program is completed in 1957 probably will have a payroll of 350. Three shifts are working in the *Daisy* mine, two shifts each on the *Mineral Hill* and *Glance*. The Glance is connected underground with the *Copper Queen*. This gives Banner four underground mines, plus a tiny open pit being developed for exploration purposes. However, very little production is coming from the Copper Glance and Copper Queen as these are still in the development and exploratory stage. Concentrates from the Banner mill are trucked to Sahuarita and then shipped by rail to the smelter at El Paso. A. B. Bowman is vice-president and general manager.

The program of exploration and development carried out at the *Sonoma Quicksilver Mines, Inc.* at Guerneville, California during the past year was under supervision and management of the *Black Mammoth Consolidated Mining Company*. As a result, ore reserves are estimated as follows: proved and indicated, 612,390 tons averaging 3.9 pounds of mercury per ton; inferred, 378,000 tons averaging 3.5 pounds mercury per ton. The current treatment plant is badly deteriorated and the mine plant and shaft are beyond their economic limit. Thus, production at a satisfactory profit requires a new shaft and related openings, along with a new or rebuilt treatment plant, according to the company's officials. The directors have recommended an increase in authorized capitalization to meet these needs.

Kaiser Steel Corporation has applied for permission for fast amortization on expansion of iron ore facilities at Eagle Mountain, California and coke, pig iron, ingots, and wide flange beam facilities at Fontana. The expansion is estimated to cost $65,000,000.

Pacific Coast Borax Company recently received delivery of three Bucyrus Erie shovels which will be used at the new open-pit mine under development at Boron, California.

Calaveras Cement Company has purchased a controlling interest in five California transit mix and gravel companies, for $500,000. The firms are *Standard Materials Company, Inc.* of Modesto; *Concrete Supply Company Inc.* and *River Rock Inc.*, both of Merced; *Merced Sand and Gravel Inc.* of Atwater; and *Standard Rock Company Inc.* of Escalon.

Panco Mining Corporation has started mercury operations in the Chileno Valley of Marin County, California. The firm has a 10-year lease on the property from Fred Bentley who will receive royalties. Production is expected to be about 25 tons per day.

Coso Uranium, Inc. of Long Beach, California has been granted a $30,725 loan by the Defense Minerals Exploration Administration to explore for uranium on 520 acres of claims in the Coso Range, 10 miles east of Olancha, Inyo County, California. Helen and J. S. Wisdom have been granted a $7,400 DMEA loan to explore for tungsten in Inyo County.

NEVADA

The 100-ton mill of *Newmont Mining Corporation* at Goldfield, Nevada reportedly was purchased by *Monarch Mining and Milling Company* of Las Vegas for about $70,000. Also included were some buildings and four mining claims in the district, including the *Florence*. It is believed that ore will be trucked to the mill from the Ione-Berlin district of Nye County.

The ore discovery reported earlier in the year on the 500 level of the *Bristol Silver Mines Company's* operation at Pioche, Nevada has produced about 4,000 tons, with a net smelter return of over $200,000, according to the firm. Daily production from the 500 level has now reached 80 dry tons per day.

Eureka Corporation plans a widespread lateral exploration program from the TL shaft on the 850, 950, and 1050 levels. To facilitate this, a new pump arrangement capable of pumping a maximum of 7,500 gallons per minute is being put into service. Three 200-hp., submersible, deepwell pumps are installed in a special sump on the 1050 level to pump water to the 850 level. On the 850 level, six 350-hp. station pumps will lift water to the surface.

Consolidated Virginia Mining Company, which is reactivating its properties on the Comstock Lode at Virginia City, Nevada, is now negotiating with *Hampton Mining Company* of Utah for acquisition of the latter's holdings. This includes an operating interest in 1,800,000 acres of Panama concession.

Union Carbide Nuclear Company's Riley tungsten mine 15 miles northwest of Golconda, Nevada resumed operations shortly after the government extended the tungsten buying program to December 31, 1958, or purchase of 1,250,000 ton units, whichever occurs first.

Twentieth Century Fuels, Inc., formerly *Tonopah Gipsy Queen Mining Company*, has acquired the *Nevada Pacific Company* tungsten claims about nine miles from Gabbs, Nevada. The company hopes to undertake open-pit operations there shortly.

With the new appropriations available to the United States Geological Survey for the fiscal year 1957, some new field investigations in Nevada will be undertaken. Geologic mapping in support of mineral exploration will be carried out in Humboldt, Stillwater, and Snake Ranges, and in the Bullfrog area. These will all be done in cooperation with the Nevada State Bureau of Mines.

Mullen-Buckley Uranium Corporation of Los Angeles, California has leased 22 mercury claims from the *Western Mercury and Uranium Corporation* of Las Vegas, Nevada, and has started exploration work. The mine is located 18 miles southeast of Tempiute-Lincoln tungsten properties. Frank Mullen is president, and Allen Buckley is executive vice president.

NEW MEXICO

Acquisition of 23 percent of the stock of *Mid-Continent Exploration Company* at a cost of $4,000,000 has been announced by *Rio de Oro Uranium Mines, Inc.* Rio has been shipping 1,500 tons of ore per month for five months from the Ambrosia Lake region where the company holds some 5,400 acres under option

and lease. The 23 percent purchased has been held by Louis Lotham who drilled the discovery shaft in the Ambrosia area a year ago. Also purchased was a 5 percent override royalty held by the land owner, Mrs. Stella Dysart.

Atomic Resources Corporation has taken an option on one-half interest in the *Twining* copper operation owned by *Taos Uranium Company* of Taos, New Mexico. Fifteen percent of Atomic Resources reportedly is owned by *Molybdenum Corporation of America*, and about eight percent is owned by *Kennecott Copper Corporation*.

Phillips Petroleum Company reports discovery of a 1,500,000-ton, high-grade uranium ore body in the Ambrosia Lake area of New Mexico. The discovery came from intensive core drilling on a 1,280 acre mining lease. Phillips is now acquiring full working interest in the lease by purchasing the remaining one-quarter interest previously held by *Holly Minerals Inc.* Further drilling continues on the unexplored portions of the lease. A mining shaft is to be started soon.

United Western Minerals Company and its farmout group have signed a farmout agreement with *Nava-Zuni Development Corporation* covering area in the Smith Lake region of McKinley County, New Mexico. Terms of the agreement provide for a minimum of 50,000 feet of exploratory core drilling on the section with work to be completed prior to March 1, 1957. The farmout group jointly interested with United Western Minerals are *San Jacinto Petroleum Corporation, J. H. Whitney & Company*, and *White, Weld & Company* of New York. Several other farmout deals for exploration and drilling of United Western leaseholds are said to be under negotiation at the present time.

Mercury Uranium & Oil Company of Albuquerque, has commenced exploratory drilling on a 380-acre Navajo mining permit in the Monument Valley, Arizona. The property is adjacent to *Vanadium Corp. of America's Monument No. 2* mine, one of the largest of uranium producers.

The Defense Minerals Exploration Administration has contracted with *Four Corners Exploration Company* to carry on exploration work in McKinley County, New Mexico. The contract value was listed at $82,060, with the federal government's share at $61,545.

Ambrosia Minerals Inc. has purchased the *Tower Mining & Refining Company* at Socorro, New Mexico for $250,000. The Tower property, purchased from J. W. Pace of Sweetwater and Fort Worth, Texas, will handle its own and custom milling at 1,500-ton daily capacity. The mine is said to have a reserve of 100,000 tons of proven manganese ore.

Considerable prospecting for uranium has been going on in the Sacramento Mountains of southeastern New Mexico, but the first actual development has been by A. O. Freeman and F. C. Greeff at their *Pines No. 2* mine. In a 50-foot tunnel the owners say that a sizable vein of ore contains 0.18 percent U_3O_8, and considerable copper.

Delmar Spafford and Son of Farmington, New Mexico are working on a tunnelling operation to intersect the old Begay shaft west of Shiprock on the Navajo reservation. M. K. Brimhall is general manager, with David Kee of Red Rock, Arizona, in charge. Lessee is Ugene Topahuso. The operation is on King Tut Mesa in San Juan County, New Mexico.

Dunn Brothers of Dallas, Texas are reported to have blocked out a 450-ton, high-grade, ore body in McKinley County, New Mexico half-way between Haystack Butte and Ambrosia Lake. Development is by agreement with principals of the old *Dakota Mining Company*. Principals are Vern and Stanley Haton and John Gosset, all of Grants, and Paul Ramsey, of Mancos, Colorado.

Potash Company of America at Carlsbad, New Mexico has worked out a method of measuring the weight of ore traveling on a conveyor belt. The device, designed by PCA engineers, converts weight of potash on the belt into air pressure, which moves a recorder pen up and down on a circular chart.

International Minerals & Chemical Corporation, at its potash property in the Carlsbad district of New Mexico, has found that plastic coating inside of cleaned pipe lines carrying water to the plant may increase the flow and reduce the required pump pressure. A 12-inch line was taken out of service for cleaning, and two 8-inch by-pass lines more than carried its capacity flow. Work is being done by the *Pipecote Service Corporation*.

Five States Uranium Corporation of Albuquerque, New Mexico has voted to merge with *Ambrosia Minerals, Inc.* Five States has a producing mine on Tomsich Mountain in Emery County, Utah, averaging over 25 tons a day. The Ambrosia firm recently purchased the *Herald Mining Corp.*

Northwest Mining Group Meets Nov. 30-Dec. 1

The Northwest Mining Association's 62nd annual convention is scheduled for November 30 and December 1 at the Davenport Hotel in Spokane, Washington. A varied program is planned, with more than usual interest on uranium.

Lowell B. Moon, district geologist in charge of the Spokane Northwest district office of Bear Creek Mining Company, a subsidiary of Kennecott Copper Corporation, has been named as general chairman. A. E. Weissenborn, regional geologist for the United States Geological Survey in Spokane, is vice chairman. Wing G. Agnew, chief of the Bureau of Mines' Spokane field office, is program chairman.

Salmon River Scheelite Corporation is installing a second 25-ton mill unit at its property northwest of Clayton, Idaho. Harvey Penney is president.

Royal Mining Company of Wallace, Idaho has taken over development of the *Cash Patterson* lead-silver prospect at the head of Terror Gulch, east of Kellogg and north of the Osburn Fault. The property was acquired by the predecessor firm, *St. Joe Lead and Silver Mines Company*, about 30 years ago. A crew is extending a tunnel to get under two narrow but high-grade galena showings at the surface. J. V. Grismer is president.

Sunshine Mining Company, lone antimony producer in the United States, has been shipping three truckloads of cathode antimony metal weekly to *Bradley Mining Co.'s* antimony smelter at Stibnite, Idaho. The ore is from a 2,000-ton stockpile at the *Sunshine* mine in Shoshone County. The metal is a byproduct of concentrating silver-lead-copper ores.

Golconda Lead Mines' custom mill has been operating 7 days a week on a 24-hour basis. Up to 225 tons of ore has been treated daily. The mill is east of Wallace, Idaho. Production from the *Golconda* mine has been averaging around 25 tons daily. *Lucky Friday Silver-Lead Mines Company* is the largest supplier.

Nabob Silver-Lead Company's shaft on Pine Creek in Shoshone County's Coeur d'Alene mining region, Idaho was down about 140 feet at last report and development ore was averaging about 15 percent combined lead-zinc. H. J. Hull of Wallace is president.

Echo Bay Lead-Silver Mines Company's tunneling project southeast of Bayview, Pend Oreille Lake, Kootenai County, Idaho at last report was nearing the anticipated downward extension of a rich lead-silver outcropping. Work is being done weekends by Coeur d'Alene district miners. The company has replaced camp buildings, piers, and mining equipment destroyed by rock slides in 1953. Edwin C. Schaeffer of Bayview is president.

Lucky Friday Silver-Lead Mines Company has increased production from 125 tons daily to about 180 tons at its property east of Mullan, Shoshone County, Idaho. Another extension of the Lucky Friday shaft now is under way. It will be deepened 700 feet to a new 3,000-foot level. Ore reserves down to that level are estimated at more than 500,000 tons. Charles E. Horning of Wallace is president.

The new Silver Mountain shaft east of Mullan, Shoshone County, Idaho, had reached a depth of about 1,700 feet at last report. An extensive exploration program will be undertaken from the 2000 level. The project is a venture of *Hecla* and *Bunker Hill* mining companies and the Defense Minerals Exploration Administration.

Black Bear Silver Lead Mines has repaired the underground shaft headframe at No. 1 raise, which is 2,500 feet from the adit tunnel portal, and which extends to the 600 raise level. The hoist is on the adit level, and requires 1,300 feet of cable to operate. A new cable is on order. Black Bear is operating on the 200 raise level, where a temporary sheave has been installed, and the new cable will make possible increased production. From the 200 level, Black Bear has accumulated nearly 600 tons of stockpiled, which will be milled at *Hull Lease* as soon as the latter completes present mill-run. The 6 percent lead feed is expected to yield 60 tons of 60 percent concentrate. Black Bear is located in Idaho's Burke Canyon. *Metropolitan Mines Corporation* has stock control of Black Bear. Roy H. Kingsbury of Wallace is head of Metropolitan.

The old *Dewey*, *Delmar*, and *Copper Queen* groups of mining claims on the South Fork of the Clearwater River 14 miles from Grangeville, Idaho, are being purchased by *Lucky Scarlett Uranium Mining and Development Company* of Spokane, Washington. Both open-pit and underground operations are planned for copper. Charles M. Mashtare, Spokane, is manager and secretary-treasurer.

Westore Exploration Company of Osburn, Shoshone County, Idaho, has been organized to develop unproven mining properties. Funds will come from regular monthly subscriptions of $10 by a membership limited to 500. There will be no promotion stock or underwriters' commissions. Howard F. Cameron, Osburn, is organizer and president. Earl Mithaug, Osburn, is secretary-treasurer.

Estes Gold Mines, Inc. of Boise, Idaho has been incorporated by C. E. Lanning of Caldwell; David E. Bell of McKay; and Harvey Evans of Boise. The firm is capitalized at $100,000.

Lloyd, John, Roy and Edwin Halverson, Virgil Cross and Robert Bellini, all of Jerome, Idaho, have organized *Bellcross Uranium, Inc.*, of Jerome, with $100,000 capitalization.

The old *Snowshoe* lead-silver-gold mine 17 miles south of Libby, Montana is being returned to production by *St. Paul Lead Company* of Kellogg, Idaho, and *Merger Mines Corporation*, Coeur d'Alene, Idaho. A 50-ton gravity concentrator has been constructed near the ruins of a plant which produced more than $1,000,000 worth of concentrates for an English syndicate many years ago. A lease and purchase option was obtained from Eugene Foote, Harry Keith and Josephine Grubb, all of Kalispell. Al Osborn, St. Paul Lead president, is directing operations.

Modern Metals Company of Spokane, Washington is reopening an old Montana silver-lead mine. At the *Mountain Lion*, near Deer Lodge, Deer Lodge County, closed since the 1893 "panic", a new access road has been built and surface bulldozing completed. Plans call for a 750-foot creek level adit to connect with an old 450-foot shaft. State Senator Lloyd Andrews of Spokane is one of the principals in the privately owned firm.

Twenty carloads, or 1,100 tons, of phosphate ore are being shipped daily from the new *J. R. Simplot Company Centennial* mine near Lakeview, Montana. During this first season of operation, ore is being hauled to Monida for re-shipment. A railroad is planned for Lakeview where the ore will then be crushed and loaded in rail cars for shipment.

Minerals Engineering Company recently acquired the *Red Button* tungsten

Thorium Vein Located on Idaho's Hall Mountain

Good values in thorium oxide and titanium, with some copper and silver, have been found in a five-foot fissure vein opened by Hall Mountain Thorite Mining Company near Porthill, Boundary County, Idaho. The black thorium vein can be seen over the tunnel entrance in the picture above. The face of the 30-foot tunnel reportedly assayed more than 8 percent thorium oxide. Bruce Berringer, who discovered and staked the seven-claim property himself, also built 2,400 feet of access road. He plans to tunnel further into the mountain along the strike of the vein and then to diamond drill. He reports that he is also dickering for a 30-ton concentrator to be installed when probable ore reserves are established. Northwest Prospecting and Development Company of Spokane has resumed development of its Wawa claims which adjoin Mr. Berringer's claims. Surface trenching by bulldozer was to be followed by diamond drilling. Carol W. Greear of Spokane is secretary-treasurer.

claims 50 miles northwest of the Glen, Montana mill and has already made first shipments of ore. The firm expects to make deliveries of approximately 10,000 units per month from each of two domestic mines under the government's reactivated tungsten buying program. Meanwhile, the firm is also continuing drilling and exploration of its *Carter* iron property about eight miles east of Dillon, Montana. Indicated reserves now are approximately 200,000,000 tons of which 52,000,000 tons is proven with a 30 percent iron content.

According to Dewey F. Whittaker, president of the *Montana Iron Mining Company*, preliminary plans are being made by his firm for the possible construction of a steel plant in central Montana if enough iron ore is proven to provide a sufficient reserve for the plant. The company has claims in several Montana counties, with present mine operations near Stanford.

The Montana State Land Board has approved an agreement between *Midas Minerals, Inc.* and Omer Edgar of Hall, Montana for the development of Mr. Hall's phosphate property in Granite County, north of Philipsburg. Under the new agreement, the company will provide the investment for development of the phosphate in commercial amounts and for its marketing.

OREGON

Sunshine Mining Company of Kellogg, Idaho has leased a group of quartz-gold properties in the old mining camp of Bourne, Grant County, Oregon. Included are the *Columbia*, *Tabor Fraction*, *E&E*, *North Pole*, and *Villiard* mines, all located on the North Pole-Columbia Lode. At one time all of these mines were operated as independent projects, each with its own mill. Sunshine is undertaking an extensive amount of rehabilitation of the old workings before starting any new exploratory development work.

Mercury production has started at the *Bretz* cinnabar mine operated by the *Arentz-Comstock Mining Venture* in southern Malheur County, Oregon. A 100-ton mill has been completed and open-pit mining is underway. In the past years, the property was drilled by *U. S. Mercury Corporation*; then *Shawano Development Corporation*. The mill was built on an operational agreement between the Arentz-Comstock company and Shawano corporation. John Ruiz of McDermitt, Nevada owns many of the claims.

O. K. Coster and Carl Wikstrom have erected a small mill at their *Rock Creek* chrome mine in the southwest sector of Coos County, Oregon.

Lakeview Mining Company has been pushing exploratory work at the *Lucky Lass* and *White King* uranium mines in Lake County, Oregon. Three core drilling rigs worked double shifts. Initial test shipments were made a year ago to *Vitro Uranium Company* of Salt Lake City, and a 400-ton shipment was made recently. The firm also has been doing aerial prospecting in Lake County and making reports on anomalies available to pros-

pectors to spur ground exploration for uranium.

An occurrence of ferruginous bauxite near Garden Home, suburb of Portland, Oregon contains more than 40 percent aluminum oxide, according to the Oregon State Department of Geology and Mineral Industries. Where exposed in an old railroad cut, the bauxite is three to four feet thick.

WASHINGTON

Prospecting on the Spokane Indian Reservation, southwestern Stevens County, Washington has been stimulated by a 15-month extension of a prospecting permit system to December 31, 1957. Tribesmen, who alone were granted prospecting permits, had maintained that delays in approving permits and assignments to mining companies prevented thorough prospecting of permit areas and selection of 160 acres for leasing by the original September 30 deadline.

Independent uranium prospectors and producers in the Spokane area will be assured of a daily market for 100 tons of ore meeting grade and amenability standards when *Dawn Mining Company's* $3,000,000 uranium processing plant at Ford is completed next summer. The Atomic Energy Commission's contract with the *Newmont Mining Corporation* subsidiary provides that the firm must take 25 percent of its mill capacity from custom shippers if offered. The new plant will use the column ion-exchange flowsheet.

A new town near the site of *Dawn Mining Company's* uranium processing plant 40 miles northwest of Spokane will be named *Uranium City*. Initial plans called for a 30-unit trailer court and 20 remodeled prefab houses. *Ford Development Corporation*, headed by William O. Kumbera, Spokane, is carrying out the project.

Sunset Mines, Inc., a producer of zinc and lead in the Pine Creek district of north Idaho's Coeur d'Alene mining region, has started stripping a radioactive area in the Spokane Indian Reservation of northeastern Washington. The firm is exploring two sections near Wellpinit. David Harvey, Seattle, is vice president in charge.

A limestone deposit north of Metaline, Pend Oreille County, Washington, near the Canadian boundary, is being test drilled by *Hecla Mining Company* of Wallace, Idaho. Stanley Johnson, *Hecla* engineer, is in charge. L. J. Randall is Hecla president.

The Defense Minerals Exploration Administration has approved a $11,310 project at holdings of *LaSota-Jones Lead and Zinc Corporation* in the upper Slate Creek area of the Metaline mining district, northern Pend Oreille County, Washington. The firm is a partnership of F. P. LaSota, E. P. Jones, Dolly Ricker, Nick Mandich, and J. P. Sullivan, all of Metaline Falls.

Daybreak Uranium, Inc. has put a third uranium property into production in the Spokane area. At last report, 6 railroad cars of autunite averaging 39 percent U_3O_8 had been shipped from the firm's

NORTHWEST

Huffman lease one mile northeast of its *Daybreak* mine in the Mount Spokane district. Several pods of high-grade were exposed by bulldozer work. An independent engineering survey of five Daybreak properties lists 55,800 tons of proven commercial ore, 461,700 tons of interred ore, and 1,158,900 tons of potential ore at shallow depths. William Fox is president and Kae Sowers, secretary.

High-grade autunite has been uncovered at a depth of 10 feet on the Quartz Ridge claims of *Highnoon Uranium Mines, Inc.*, in the Lost Creek area of the Kaniksu National Forest, Pend Oreille County, Washington. Extent of the deposit has not been determined. The claims were optioned from prospectors Vern P. Sauer, Virgil Sauer and Glenn Hersey of Ione, C. N. McJunkin of Hermiston, Oregon, and M. R. Sharp of Umatilla, Oregon. Charles A. Pulford of Newport is company secretary.

Mineralized zones at depths of 16 and 32 feet were indicated in the recent percussion drilling by *Dahl Uranium Mine, Inc.*, in the Mount Spokane area. The work is being done by *Mine Consultants, Inc.*, headed by William D. Weaver, who organized Dahl Uranium. The company has stepped up its uranium search in the Spokane Indian Reservation.

Ferry County's most active uranium exploration this season has been on Mount Leona, 6500-foot peak north of Republic, near Curlew, Washington. The mountain top is solidly staked. *M. P. C. Mining Company*, under direction of Joe Morris of Lebanon, Oregon, used a tractor to pull equipment up the steep slope to its claims. At last report it was doing percussion drilling. *Pacific Uranium, Inc.*, Seattle, was doing bulldozer stripping and drilling shallow blast holes.

The United States Geological Survey has undertaken a study of the Mount Spokane uranium district to determine whether its lone autunite mineralization is the original mineralization and therefore primary or whether it was oxidized from uraninite at depth. R. G. Coleman, Washington, D. C., is conducting the study.

Uranium has been found in the Silver Creek mining district 60 miles northwest of Seattle. The discovery was made by Fred Rosario during a prospecting-fishing trip.

Ted A. Tester and associates of Spokane have leased a 17-claim uranium prospect east of the Skookum lakes in Pend Oreille County and plan bulldozing and drilling after geological mapping. Adam Miller is mining engineer in charge.

Claim filing activity in northeastern Washington this summer has been heaviest in Pend Oreille County. Recent filers included *G. M. Uranium Metals, Inc.*; *Monarch Uranium Mines, Inc.*; Ralph Peterson, Thomas Myers, S. P. Myers, Joseph R. Myers, Walter Elmount and Katherine Schauer, all of Seattle; Carl E. McKenney, Robert E. Weyher, John F. Greinert, Theodore R. Killberg, Glen V. Doyle and J. H. Zickefoose, all Spokane; C. M. Ritter, Astoria, Ore.; Kenneth Grossarth, Smeltervilie, Idaho; Ralph Jay Jr., M. J. Kennedy, Bill Burnam and Ray Boggs of Ione; H. L. Cordley, Pasco; Charles D. Madden and Irene Hunt of Coeur d'Alene; E. F. Houck, Tiger; Max Morgan, Priest River, Idaho; David P. Weir, Rathdrum; Johnnie M. Bisaro and M. H. Hoffman, Kellogg, Idaho, and H. B. Irwin, Metaline Falls.

precipitates—CENTRAL AND EASTERN

Fansteel Metallurgical Corporation has chosen Muskogee, Oklahoma as the site for its new $6,500,000 tantalum-columbium plant. It was selected, after consideration of more than 150 cities, for reasons of availability of electric power, water, natural gas, and manpower. The new plant is expected to increase present tantalum capacity by 50 percent and columbium capacity by 150 percent. The company's main plant is in North Chicago, Illinois.

Algomah Mining Company of Ontonagon, Michigan, which has been making shipments from its copper property 17 miles east of Ontonagon, is preparing for all-winter operation. The inclined skipway is being enclosed on the surface as an addition to the present surface building.

Freeport Sulphur Company will mine the surphur deposit located by *Humble Oil & Refining Company* off the coast of Louisiana in 1954. (See MINING WORLD, August 1954, page 57 for first details.) Under a contract signed by the two firms, Freeport will design, install, and operate a mining plant to produce sulphur by the Frasch process. Construction must start by the latter part of 1958 and is expected to take two years to complete. Freeport will pay basic royalties to the Federal government and will pay Humble certain royalties. The effect of this is that both firms will receive, after taxes, about 50 percent of the net profits.

The *Southwestern Illinois Electric Cooperative Inc.* has an option to purchase the electric distribution system of *Rosiclare Lead and Fluorspar Mining Company* for the city of Rosiclare, Hardin County, Illinois. Purchase price is $40,000. The company closed down its mines and mills in 1954 after almost 100 years of continuous operation.

Quincy Mining Company is dredging 3,000 tons of tailings per day from Torch Lake, Michigan. In 1955 these operations recovered a total of 4,727,211 pounds of copper. The tailings were accumulated from milling operations in earlier days when several shafts were producing copper in the area. The company operates its own reclamation plant on the shores of the lake.

American Zinc Lead & Smelting Company's Thompson property in Wisconsin is expected to go into production during the first quarter of 1957. This property adjoins the *Temperly* which went into production last year and is making good progress. At the firm's *Piquette* mine the ore body has been extended sufficiently to add 20 percent to the proven reserves.

Kaiser Aluminum & Chemical Corporation will build a pilot plant on the phosphate mining property of *Virginia-Carolina Chemical Corporation* at Nichols, Florida to determine what minerals or chemicals can be profitably extracted from phosphate waste.

The *General Services Administration* is buying columbium-tantalum again. The latest purchase program, for domestic production only, gives the GSA authority to purchase a maximum of 250,000 pounds between now and December 31, 1958. The agency will pay between $1.40 and $3.00 a pound for the mineral, plus bonuses equal to the purchase price to whoever actually mined the ore. This 250,000-pound goal is more than the domestic industry has ever produced in any two-year period. In 1954 mining of columbium-tantalum was not quite 33,000 pounds.

The stockpiling unit of the *General Services Administration* has been reorganized and renamed the *Defense Materials Service*. Formerly called the *Emergency Procurement Service*, the agency was organized in the early days of stockpiling when it was truly an emergency measure. Today the stockpile is valued at $6,500,000,000. The new group will continue to carry out stockpiling directives received from the *Office of Defense Mobilization* and will also handle other directly defense connected activities assigned to the GSA.

A public hearing on a petition filed by the domestic fluorspar producers under Section 7 of the Trade Agreements Extension Act of 1955 will be held on November 12 at 2:30 in Room 474 of the Executive Office Building in Washington, D. C. The filing date for requests to be heard has been extended to November 5 and such requests must be addressed to the *Office of Defense Mobilization*, Washington 25, D. C.

Parker Mining & Development Company has received a $7,558 DMEA contract to explore for copper in Frederick County, Maryland.

Hycon Aerial Survey flight crews have been operating in the eastern United States recently. One crew conducted a geophysical survey of New York State in a Super Cessna No. 1, while a PBY flying geophysical laboratory conducted an airborne electromagnetic survey of the eastern seaboard.

Preliminary construction work has been started at the new *Stephens* mine of the *United States Steel Corporation's Oliver Iron Mining Division* near Aurora, Minnesota, with the start of stripping operations. Also underway are bridge and road construction, and building of dams.

Attempting to make up the huge iron ore deficit caused by the numerous strikes this season, the Great Lakes shipping industry pressed into service practically anything that would float. The fleet still failed to gain on the 1955 total, however, as cumulative shipments were reported at 54,622,958 tons on October 1, 1956 as compared with 67,622,152 tons at this time one year ago.

Ashland Mining Company has engaged *Pickands, Mather & Co.* to begin taconite mining operations at Ashland's property near Butternut, Wisconsin. Ashland holds 760 acres estimated to contain 200,000,000 tons of low-grade taconite ore, bearing 28 to 32 percent total iron content. Initial ore mined will be shipped to Hibbing, Minnesota, where Pickands Mather will conduct pilot plant operations to determine the best processing method for this ore.

Universal Wobbler Saves Time at Iron Ore Mine

The photograph above, taken by MINING WORLD's Manager of Engineering Services, Henry Grundstedt, shows a Universal Wobbler feeder handling iron ore at the Pacific Isle Mining Company's Julia mine at Virginia, Minnesota. A Euclid truck dumps ore from the pit into the hopper at the top of the picture. The rock, falling through into the feeder, is classified by the Wobbler into a fine and coarse product. The fine ore is trucked to the mill by a Euclid tractor trailer unit shown receiving fines from the fine conveyor (at right rear), and coarse rock is fed by the Wobbler into the Euclid end dump truck in the front. The Wobbler is a great time saver at this operation because by separating the ore, the beneficiation plant is relieved of the job. The fines are trucked directly to the mill, while the coarse rock containing little or no iron is taken to the waste dump. The feeder has been in operation here for approximately five years with no significant repairs.

Vitro Plans $1,200,000 For Mill Alterations

Vitro Corporation of American plans to spend $1,200,000 in expanding and improving its uranium mill at Salt Lake City, Utah. The ore extraction process will be converted from the present phosphate precipitation method to a solvent extraction process, and capacity of the plant will be increased about 20 percent.

Start of construction hinges upon actual signing of contracts with the United States Atomic Energy Commission. (The contracts have been negotiating but had not actualy been executed as this story goes to press.) The present contract expires December 31, 1956; the new contract would extend this date to March 31, 1962, and at the new lower unit price level now being paid by the AEC.

Vanadium Corporation of America is reported to have purchased a one-third interest in the *Eagle Basin* group of 27 claims in the Long Park area of Colorado. T. C. Brammeier and Henry Brammeier are the owners of the property which actually extends over 550 acres. The firm is seeking additional uranium-vanadium ores for its Naturita mill, and has also leased 42 claims on a royalty basis from *Marysvale Uranium Company* of Utah. These claims cover 850 acres in the Marysvale area.

Beaver Mesa Uranium, Inc. of Grand Junction, Colorado expects production to increase to 5,000 tons a month with the opening of the new Rajah No. 28 shaft in Mesa County. The 330-foot shaft is the second to be sunk by Beaver Mesa in the same vicinity. The Cherokee has been supplying current output, and in August Beaver Mesa shipped 3,000 tons of ore.

Climax Molybdenum Company at Climax, Colorado will install a second seven-foot Standard Symons crusher on the Storke Level to meet a daily production goal of 34,000 tons. The new crusher will be identical to the present secondary crusher which is set to achieve crushing to particles of 1¼-inch size at a rate of about 1,000 tons per hour. The company reports that work is progressing satisfactorily on the new No. 17 milling unit which will enter the circuit in March to increase recovery of molybdenum disulfide concentrate by about three percent with no increase in tonnage.

American Smelting and Refining Company's smelter at Leadville, Colorado is currently operating on a favorable basis. *Idarado Mining Company*, which is managed by *Newmont Mining Corporation*, has recently doubled its production at Ouray and Telluride, and ASARCO itself is shipping tonnage from the Keystone unit at Crested Butte. In partnership with Newmont, ASARCO is preparing for operation of the *Ibex-Sunday* and *Helena* properties at Leadville.

The *Tamarack* copper mine, 12 miles northwest of Buena Visa, Colorado, has been reopened after 53 years of litigation. The property has been acquired by *Natural Power Corporation*, and has already started putting the mine into condition for start of operations. An assay made of the deposit in 1926 indicated that ore averaged 15.8 percent Cu per ton. The property is in the foothills of Mt. Harvard, and located at an altitude of 9,145 feet.

Monsanto Chemical Company is building a phosphoric acid unit at *The Colorado Fuel and Iron Corporation's* plant in Pueblo, Colorado. Electric furnace elemental phosphorous will be shipped from Monsanto's plant at Soda Springs, Idaho to Pueblo where it will be burned in the new unit to make phosphoric acid.

Utah Power & Light Company will construct a 69,000-volt line from Monticello to Blanding, a distance of 22 miles, for *Texas Zinc Minerals Company* and the City of Blanding. Texas Zinc then plans to construct the line the remaining 52 miles from Blanding to Mexican Hat, 10 miles north of the Arizona border, where the firm is erecting a uranium mill. Texas Zinc will own the line from Blanding to Mexican Hat. Both towns are to receive power by January 1, 1957.

Howe Sound Company's cobalt refinery at Garfield, Utah is rapidly reaching the 250,000-pound monthly rated capacity for which it was designed. In the second quarter of this year, the firm reports that the plant produced an average of 227,000 pounds of cobalt metal. No major operating difficulties were reported, and several changes in the flowsheet were made to simplify the plant. For the first six months of 1956 Howe Sound virtually doubled its output with 1,200,253 pounds of cobalt compared with 673,417 pounds in the same period of 1955.

Colorado Tungsten Mine

The Eureka tungsten mine in Boulder Canyon, 12 miles west of Boulder, Colorado, is doing extensive development work. Owners of the mine are E. B. Ralston, shown above with one large chunk of ore weighing 99 pounds, and John P. Keifer. They have sunk an 80-foot shaft, and lessees are driving a five- by seven-foot drift in two directions from the shaft. Three crews are at work, including six stopers. A new compressor has been purchased, making two now in use. They are arranged in tandem so that both can be used at once to work four machines.

Utah Construction Company has received an $8,000,000 contract to drive an ore haulage tunnel at *Kennecott Copper Corporation's* Bingham Canyon open-pit mine. This figure covers only the driving of the 18,000-foot tunnel; tracks and equipment are expected to bring the project total to well over $10,000,000. This is the third tunnel in Utah's plan for underground ore haulage from the open pit. To be known as the 5,490-foot railroad tunnel (based on height above sea level), it will be 350 feet below the 5,840-foot tunnel, and will be concrete lined. It will take about three years to "hole through" to the pit side, and by the time the tunnel is completed, the bottom of the mine will be at least on tunnel level, say Kennecott officials.

New Park Mining Company had a two-week shutdown at its *Park City* property in Utah in September. Operations have resumed on a limited basis, with about 150 men on the payroll.

Radium King Mines, Inc., an affiliate of *English Oil Company* and *Panhandle Oil Corporation*, has received a $26,280 DMEA contract for exploration and development of uranium ore 15 miles east and slightly north of La Sal, San Juan County, Utah.

More than 10,000 feet of drilling has been done by *Silver Dollar Mining Company* of Spokane, Washington, on its 53-claim *Fry Mesa* property west of Blanding, Utah. More than 10 miles of bulldozer road have been built to provide drilling and rim stripping sites. A mineralized channel has been found at depths ranging from 40 to 140 feet. Elmer E. Johnston is president.

Approximately 1,960 acres of public land in the Monticello district of San Juan County, Utah, which had been withdrawn from location of mining claims on January 19, 1954, by virtue of an AEC application filed with the Bureau of Land Management, have been released from the withdrawal. The released lands are in the Salt Lake Meridian. Persons considering prospecting and locating mining claims in the area are urged to check the records of the Land Office in Salt Lake City to determine whether the lands are otherwise open to prospecting and location of mining claims, and are urged to check on existence of prior unpatented claims in the area.

Delhi-Taylor Oil Corporation has increased its potash holdings north of Moab, Utah to 19,000 acres.

Eureka Hamburg Mining Company and *Grand Development Company* have agreed upon a joint venture operation of the *Kaiser Hamlin* mine in the North Salt Wash of the Henry Mountain district in Garfield County, Utah. Production is expected to start with shipments of about 200 tons per month, and will be increased to about 600-ton per month as soon as possible. A considerable amount of ore had been blocked out previously.

International Oil and Metals Corporation has started shipments of uranium ore from its *Divide* mine in the Big Indian district of San Juan County, Utah. An initial producing rate of 100 tons is being maintained, with plans for later expansion to 200 tons per day. At the Divide mine, also known as the *Yellowjacket*, an incline shaft has been driven 575 feet to intersect a major ore body discovered in late 1955. The ore will be

transported to the surface on shuttle trucks.

Drilling of a 16-claim uranium prospect on Waterfall Mesa, San Juan County, adjacent to the *Wilson* uranium-vanadium mine, has been started by *Inspiration Lead Company* of Spokane, Washington. The property is leased from *Hayden Hill Consolidated Mining Company* of Spokane. W. H. Simons, Inspiration Lead's Utah manager, is in charge. R. R. Weideman is company vice president and general mine superintendent.

WYOMING

The *Swan-Finch Oil Corporation* has signed leases on 150 more uranium mining claims and plans to begin drilling operations there immediately. The new leased areas cover some 4,000 acres in Carbon County, Wyoming. The firm's subsidiary, *Colamer Corporation*, will take over the project.

Columbia-Geneva Steel Company of Provo, Utah has shipped 100 tons of iron ore from its holdings south of Lander, Wyoming to mills for testing. The company has also stockpiled another 100 tons, if test work requires additional ore. The firm has been working on this property in the Rock Creek area, about 25 miles south of Lander, for a number of years.

The *Four City Mining Company* of Riverton, Wyoming, has started uranium production from the Copper Mountain area, shipping to the AEC buying station at Riverton. The ore is being mined from an open pit, with overburden varying from a few inches to 30 feet. The vein is between four and six feet thick. The mine is located two miles east of the *Little Missouri Mining Company* property on Copper Mountain, which has been producing uranium for more than a year and a half.

Mountain Mesa Uranium Corporation of Casper, Wyoming has completed some 4,000 feet of test drilling in a large-scale testing program on its holdings in the Gas Hills area. Ralph Thurston of Lander, geologist for the firm, said 13 of the first 25 holes showed ore grade mineralization, seven showed mineralization and only five were unmineralized.

National Tungsten Corporation has subleased more than 40,000 acres of uranium and associated mineral leases in Wyoming, mostly in Fremont County. Grantors were H. Lew Hensey and associates of San Francisco, Calif. National Tungsten engineers are conducting a survey prior to a drilling program.

Gas Hills Uranium Company is now shipping ore from its *Sagebrush No. 1* claim in the Gas Hills area of central Wyoming. Roy Noble of Lander, superintendent, reports the firm has a quota of 350 tons per month with the AEC buying station at Riverton, Wyoming. An ore body conservatively estimated at 8,000 tons of an average grade of 0.30 U_3O_8 has been blocked out. An incline has been dug to the 65-foot level, where a horizontal drift starts into the ore body. Mr. Noble said the operation is the first in the Gas Hills to be planned from the beginning as an underground operation. Due to extreme winter weather and high

stripping costs, he said, the underground operation will be cheaper than open pit.

The recently formed *Wyoming Mining Association* will present a proposed mining safety code to the 1957 session of the State Legislature, which meets in January. R. Lauren Moran, Riverton attorney who is president of the association, said the suggested code will be presented because the present coal mining safety code "is not adaptable to uranium operations," which have brought a resurgence of mining activity to the State.

The Wyoming Legislative Interim Committee will recommend to the 1957 State Legislature that laws be passed to provide protection for surface owners who do not own the mineral rights from loss due to prospecting. At present, laws provide recompense for the surface owner from damages by mining operations, but not from prospecting. Ernest L. Newton, executive secretary for the committee, said it also would recommend that prospectors be required to post a surety bond before prospecting on land of such status if requested by the surface owner.

Racing against the early Wyoming winter, *Phelps Dodge Corporation* has nine drill rigs at work on the uranium property it has under option from *Wyoming Uranium Corporation* in the Crooks Gap area. The firm has two drills of its own and seven under contract from *Teton Exploration Drilling* of Riverton, and *GEOHOLE, Inc.* of Dallas, Texas. Some 50,000 feet of drilling is involved.

First uranium leases on the vast Wind River Indian Reservation in Central Wyoming have been granted. Lynn Jenkins, reservation realty officer, announced leases were granted to a number of partners from nearby Lander and Riverton. The eight 40-acre leases were subsequently assigned to *Washakie Exploration Company*. Some ore has already been stockpiled on the property and further testing and production is expected to follow shortly.

Continental Uranium Corporation has two drilling rigs operating on claims it purchased in Crooks Gap area of Wyoming from *Gaddis Mining Company* for several million dollars. The drills are blocking out additional tonnage in ore bodies drilled by Gaddis in 1955.

Union Carbide Nuclear Company has taken a drilling option to the *Aljob Mining Company* property in the Gas Hills section of Central Wyoming, another one of the major mining firms entering the Wyoming uranium activity. Under terms of the one-year option, UCN is to do extensive drilling on the property, from which nearly 10,000 tons of ore already has been produced. Another 2,000 tons of ore has been stockpiled at the mine. If the option is exercised, UCN will pay $400,000 cash for the property with no royalty reserved. Ed. Pinnick is geologist in charge for UCN.

Vitro Minerals Corporation, largest uranium producer in Wyoming, is blocking out an ore body on claims it has under lease in Gas Hills area from *Fremont Metals & Mining Corporation* of Lander. Several thousand tons have been blocked out, the vein running from 12 to 14 feet in thickness.

Bridger Mining Company has joined the list of companies mining uranium ore in the Gas Hills section. The firm is conducting an underground operation.

PROFESSIONAL DIRECTORY

One-inch Card, $50 Yearly—½-Inch, $35 Yearly, Payable in Advance.

CONSULTING ENGINEERS:

CHAPMAN AND WOOD
Consulting Mining Engineers and Geologists
536 Jefferson St., NE Albuquerque, N. M.
Uranium Assays - Radiometric and Chemical
Vanadium - Thorium
Mine Examination and Evaluation
Exploration and Development Management
P.O. Box 8302 Phone: 6-1675

COWIN & CO., INC.
Mining Engineers and Contractors • Consulting Appraisal Reports • Shaft & Slope Sinking • Mine Development • Mine Plant Construction.
1-18th Street, S. W. Birmingham, Ala.
Phone 56-5566

NORTON K. EARLE
Consulting Land Surveyor
U. S. Mineral Surveyor
1116½ N. Western Ave., L. A. 29, Calif.

GUY E. INGERSOLL
Registered Professional Engineer in
Texas, Arizona and New Mexico
Mine Examinations and Geological Reports
5505 Timberwolf Drive El Paso, Texas

HERBERT BANKS JOHNSON
CONSULTANT
Electrostatic Separation
Process Developments
804 Franklin Street Clearwater, Florida

PHILIP L. JONES
Consultant
Mineral Economics & Mineral Dressing
Heavy Media Specialist
405 Miners Bank Bldg. Tel. MAyfair 3-7161
Joplin, Mo.

C. P. KEEGEL
Mining & Metallurgical Engineer
Administration Appraisal
1721 So. Fourteenth St. Tel. DUdley 4-6981
Las Vegas, Nevada

MAC AFEE and COMPANY
Consulting Engineers
MINE EXAMINATION & MILL DESIGN
Exploration • Construction
Operation & Management
CHEMICAL & METALLURGICAL LABORATORY
FOR EXACT QUANTITATIVE FLOWSHEET DATA
3105 Wilshire Boulevard • Los Angeles 5
DUnkirk 8-9674 • CABLE MACAFEE

MURPHY, F. M.
Consulting Mining Geologist
1201 Maryland Parkway, Las Vegas, Nev.
Dudley 4-5235

STILL & STILL
Consulting Mining Engineers and Geologists
Room 24 Union Block Prescott, Arizona

WISSER AND COX
Consulting Mining Geologists
55 New Montgomery St.
San Francisco, California

GEOLOGICAL & GEOPHYSICAL SURVEYS
Exploration Programs & Property Evaluations
Magnetic, Gravity, Electrical & Radioactivity Surveys for Mineral Deposits & Petroleum
CLYDE H. WILSON
Geologist—Geophysical Engineer
WILSON EXPLORATION COMPANY
366 So. Fifth East, Salt Lake City 2, Utah

HARRY J. WOLF
Mining and Consulting Engineer
Examinations—Valuations—Management
One Park Place, New York 7, N. Y.
Cable: MINEWOLF Tel.: REctor 2-5307

CHEMISTS, SAMPLERS, SHIPPERS' REP'S:

ARIZ. TESTING LABORATORIES
CLAUDE E. McLEAN, REGISTERED ASSAYER
Analytical and Consulting Chemists
Box 1888 817 W. Madison St. Phoenix

B. W. DEASON V. E. WORSLEY
BLACK & DEASON
Assayers and Chemists
Ore Shippers Represented at all Smelters
P. O. Box #1888 Salt Lake City, Utah

THE COLORADO ASSAYING CO.
ASSAYERS, CHEMISTS and
SPECTROGRAPHERS
Est. 1900
Gold and Silver $2, Copper $1, Uranium $7.50. Send for free copy of our Mineralogist Pocket Reference Giving Detailed Information on all Principal Ores.
2013 WELTON ST., DENVER 1, COLORADO

T. G. Deggendorfer
Shippers' Representative
Control Assays
Box 840 Kellogg, Idaho

DICKINSON LABORATORIES
Assayers—Chemists—Metallurgists—Umpires
Shippers Representatives at Local Smelters
Representatives at Mexican Border
Points for Shippers of Manganese and Fluorspar
1300 West Main Street El Paso, Texas

LEDOUX & COMPANY
Established 1880
Chemists—Spectroscopists—Assayers
Consultation & Research
Mine Examination & Analyses
Shippers Representatives at Seaports and Refineries throughout the U. S.
359 Alfred Avenue, Teaneck, New Jersey

GOODALL BROTHERS
ASSAYERS AND CHEMISTS
SHIPPERS' REPRESENTATIVES
Helena Established 1909 Montana

HANKS, INC., ABBOT A.
ASSAYERS AND CHEMISTS
Supervision of Sampling at Smelters
Spectrographic Analysis
624 Sacramento St. San Francisco 11

HAWLEY & HAWLEY
W. E. HAWLEY, Mgr.
Assayers, Chemists
Shippers' Representative
P. O. Box 1060 Douglas, Arizona

• SPECTROGRAPHIC ANALYSES
• EVALUATION • RESEARCH
ORE RESEARCH AND LABORATORIES, Inc.
WRITE FOR BROCHURE DEPT. C
1511 LEVEE STREET DALLAS 7, TEXAS

SMITH-EMERY COMPANY
Established 1910
Assayers—Chemists
Metallurgists
Spectrographers
Shippers' Representatives
Price List on Request
781 East Washington Blvd., Los Angeles, Calif.

Wood Assaying Co., Henry E.
Established 1878
ASSAYERS and CHEMISTS
733 W. Colfax Denver 4, Colorado

DRILLING COMPANIES:

MOAB DRILLING COMPANY
Diamond Core Drilling Contractors
"Uranium Exploration is our Business"
Charles A. Steen, President
Albert Hbacek, Jr., General Manager
52 E. Central Street Box 387
Phone 4181 Moab, Utah

B. H. MOTT & SONS, INC.
Diamond Core Drilling Contractors
Air Rotary Shot Drilling
Huntington, W. Va. Birmingham, Ala.
Mfg's Core Drills & Accessories
Grand Junction, Colo.

NEW YORK-ARIZONA DEVELOPMENT CORP.
Diamond Core Drilling
614 Mayer-Heard Building Box 347
Phoenix-Arizona Globe, Arizona
Phone Alpine 2-8614

EQUIPMENT LOCATED
GA.–N.Y.–CALIF.–OHIO–TEXAS–ILL.

GRINDING MILLS
BALL MILLS—5'x14', 4'x8', 5'x8', 5'x8', 5'x10', 6'x6', 6'x7', 6'x8', 6'x10', 9'6"x11'.
HARDINGE MILLS—4'6"x16", 6'x14", 6'x22", 6'x26", 7'x22", 8'x26", 8'x48", 10'x48".
ROD MILLS—12"x24" LAB., 5'x16', 4'x8', 4'x9', 4'x14', 5'x8', 5'x10', 5'x14', 6'6"x14', 8'6"x12'.
TUBE MILLS—5'x14', 5'x22', 5'6"x22', 6'6"x21'.

FILTERS—SEPARATORS—CLASSIFIERS
OLIVER DRUM—6'x10', 12'x14', 14'x18', 11'6"x18'.
DORR RAKE CLASSIFIERS—6'x25', 8'x25', 12'x51', 14'x30'.
DORR BOWL RAKE—8'x24'x12', 5'x20'x36', 16'x54'x28'.
WOODS HAND CLASSIFIER—72", 96".
CONVEYCO SAND CLASSIFIER—4'x10'.
17 THICKNERS—100', 80', 36', 24', 16' & 12'.
20"x15 EAGLE SINGLE SCREW COARSE MATERIAL WASHER.

ROTARY DRYERS & KILNS
DRYERS—40"x21', 4'x20', 5'x40', 6'x80', 8'x125'.
KILNS—6'x28', 6'x7'x80', 7'x110', 9'x140', 10'x100'.

JAW CRUSHERS
BLAKE TYPE—60"x84", 36"x48", 30"x36", 24"x36", 18"x36", 16"x22".
SINGLE SHAFT—25"x40", 20"x36", 18"x36", 10"x24".
CAM & ROLLER—24"x40", 14"x36", 11"x36", 10"x20", 6"x20".

GYRATORY FINE REDUCTION CRUSHERS
SYMONS—3', 4', 5½'.
KENNEDY—10S, 25S, 37S.
SUP. MC C—6", 10", 15" A-C 222B.

GYRATORY PRIMARY CRUSHERS
6", 10", 14", 16", 20" & 36" SUP. McC.—GATES AL. CHAL. 3, 4, 5, 6, 7½, 8, 9, 12K.

CONVEYORS
30" x 140', 30" x 160' & 30" x 200'.

NEW 42 IN. CONVEYOR BELT
240', 8-PLY, ¾" TOP, 1/32" BOTTOM.
115', 6-PLY, 5/16" TOP, 1/16" BOTTOM.

DIESEL LOCOMOTIVES
25 TON AND 44 TON GEN ELEC DIESEL ELEC.
80 TON AND 100 TON GEN ELEC DIESEL ELEC.

AIR COMPRESSORS
3000 FCM SULLIVAN 500 HP, 2300 VOLTS.
2—3750 CFM Myer RAND, 475 HP, 2200 VOLTS.

MINE CARS
150 KOPPLE 1 & 1½ YD., 24 GA. V-SHAPE.

MINE LOCOMOTIVES
18 MANCHA 1½, 3, 5, 8, & 10 TON BATTERY.

MINE LOADERS
7 KIMCO 10S, 21, 12 B, 40.

DARIEN, 60 E. 42nd St., N.Y. 17, N.Y.

DIAMOND DRILL
Contracting Company

S. 18 Stone, Spokane 31, Wash.

- **"SUPER PIONEER" hand portable core drills**
- **"K & S INTERNATIONAL" standard surface drills**
- **"DIA-HARD" Core Barrels**
- **And a complete line of "Super Pioneer" and standard diamond drilling accessories.**

FOR LEASE: Copper property showing possibilities of large tonnage. Also granite argolite contact area giving high anomaly on scintillation counter. Ross Moorhead, Route 1, Colville, Washington.

PUMPS—PUMPS—PUMPS
SAND—TAILINGS—SLUDGE—SLURRY
ABRASIVE & CORROSIVE LIQUIDS
CAST IRON AND STAINLESS STEEL
RUBBER LINED AND PARTIALLY LINED
SIZE 2" to 14"—CALL OR WRITE
KROGH PUMP & EQUIPMENT CO., INC.
515 Harrison St.,
SAN FRANCISCO 5, CALIF.

YOUR BEST SOURCE
MINING–MILLING MACHINERY

Classifiers
1—60" x 21' Akins Spiral
1—45" x 17'3" Akins Spiral
2—6' x 25' Dorr Duplex Rake

Crushers
1—12 x 20 Davis Rolls
3—9 x 36 Cedar Rapids, Jaw
1—10 x 21 Telsmith Roller Bearing, Jaw
1—9 x 16 Eimco, Jaw

Feeders
1—54" x 16' Stephens-Adamson Heavy Duty, Apron Type
2—36" x 72" Jeffrey Traylor, Grizzley Pan, Vibrating Type

Flotation Machines
1—#250 Denver Unit Cell
32—Fagergren 56" x 56", Model HS
1—8-cell Gallagher Agitair, 48" x 48"
1—4-cell #24 Denver Sub A
1—6-cell #24 Denver Sub A

Jigs
2—42" x 42" Pan American Duplex
1—12" x 18" Denver Duplex
1—8" x 12" Denver Simplex
1—24" x 36" Denver Duplex

Filters
1—8½' 6-leaf Eimco, Rebuilt
1—6' 6-leaf Oliver, Disc
1—6' 5-leaf Oliver, Disc
1—5' x 4'8" Oliver drum
1—3' x 4' Oliver Drum

Mills, Ball
1—8' x 6' Marcy Ball
1—6' x 8' Allis-Chalmers
2—8' x 48" Hardinge Conical
1—8' x 36" Hardinge Conical
1—5' x 5' Allis-Chalmers, New liners and gears

Hoists
4—75 HP Vulcan Single Drum
3—150 HP Vulcan Single Drum
1—400 HP Vulcan Single Drum
1—75 HP Vulcan Double Drum
1—450 HP Ottumwa New, Double Drum

Loader-Mucking Machine
1—Eimco 105' overshot loader with 1½ yd. Bucket, 1954 Model
3—Gardner Denver, GD9, 18" Ga.

Locomotives
1—Universal Tramaire, Air, 18 Ga., Excellent
1—2½ T Whitcomb, Battery, 24" Ga.
1—10 T Plymouth Diesel, Std. Ga.

LARGE STOCK—TUGGER, SLUSHER HOIST, ELECTRIC MOTORS, PUMPS

MACHINERY CENTER, INC.
P. O. BOX 964 • PHONE—HU-47601 • SALT LAKE CITY, UTAH

POSITIONS OPEN

MINE SUPT., fgn.	equivalent $675
MINE SUPT., E. M. 10 yr. exp.	$775-$825
MINE SUPT., Montana	OPEN
SUPT. construction regd. engr. fgn.	$1,000
MINE SURVEYORS, Colo.	$455
MINE engr., plant, design, perm.	OPEN
MINE ENGR., fgn.	start Bd. Rm. & $425
MINE ENGRS., S. W. U. S.	varied
SAFETY engr., open pit	$525
JR. MINE engrs. Fgn. & U. S.	$400-$450
DIAM. drill f'man, fgn. 3 yr. cont.	$550
MILL SUPT., diff. Sut. Idaho	OPEN
GEOLOGIST, bauxite exp. travel	OPEN
JR. MET. engrs. (2) S. W.	$425-$468
METAL'GIST research metals	to $800
METAL'GIST, exp iron ore	to $650
METAL'GISTS, chemists, Ch. E. s. res'ch.	to $800
ASST. metal'gist or chemist, S.W.	to $525
METAL'GIST physical tests, Colo.	$525
METAL'GISTS (3) uranium	$500 up
CHEM. ENGR. pilot plant exp. S.W.	$700 up
CHEM. engr., chem. plant exp. S.W.	OPEN
MET. & CHEM. engr. grads.	$375-$450
DESIGNER, drafts. mine, fgn.	$600-$650
DESIGNERS, elect. mech. Denver	to $650
MILL design checker, Denver	$475
METALLURGIST or chem. engr. S.W.	$440
JR. METAL'GIST, 1-2 yrs. exp.	$400
MET. or chem. engrs. grads.	start $360
ENGRS. met., chem., mech.	$378-$700
MECH. project engr. const. perm.	$630
INDUST'L engr. 5 yr. exp. fgn.	$750
INDUST. engr. large mill	OPEN
ASST. plant engr. large mill	to $550
MASTER mech. 35-45, mine, fgn. no fee	$650
CHF. CHEMIST, metals, Pa.	$600-750
CHEMISTS, a-sayers	$400-$500
LABOR relations engr., Nev.	$830
BUDGET engr., M.E.A., mine, sple	to $700
MINE bkkpr., New Mex.	start $400 to $425

GLENN B. WILSON
EMPLOYMENT SPECIALISTS
306-310 BOSTON BLDG., 828-17th ST.
DENVER 2, COLORADO

ALLISON STEEL MANUFACTURING COMPANY

Mine and Mill Buildings • Mine Rails • Ore Cars • Steel Gallows Frames • Ball Mills • Muck Plates • Crucible Drill Steel

---

We offer a complete repair service to the Mining Industry. Our new Machine Shop is equipped to handle your work quickly and economically.

Hot Milling of All Types of Detachable Bits

SOUTH 19TH AVENUE
PHOENIX ARIZONA
PHONE ALpine 8-7731

THE MARKET PLACE

FAST, ECONOMICAL SERVICE ON DEPENDABLE RECONDITIONED MACHINERY SINCE 1898.

CLASSIFIERS
1—27" x 14'9" Denver Simplex Rake Classifier
1—36" x 18'4" Dorr Simplex Rake Classifier
1—45" x 17'3" Akins Spiral Simplex Classifier

CORE DRILL
1—Longyear Portable Core Drill, Gas Engine Driven

LABORATORY EQUIPMENT
5—2¼" x 3½" New Morse Lab Jaw Crushers
3—4" x 6" New Morse Lab Jaw Crushers
1—Gates #00 Lab Gyratory Crusher
1—McCully #1 Lab Gyratory Crusher
2—Stearns-Roger Lab Batch Ball Mills
1—8" x 60" New Morse Lab Classifier
2—500 Gram Denver Lab Flotation Cells
1—1000 Gram Morse Lab Flotation Cells
4—2000 Gram Denver Lab Flotation Cells
2—Stearns-Roger Lab Pressure Filter
1—18" x 27" Revolving Lab Dryer
1—16" Lab Pug Mill

VENT PIPE
1539'—16" Steel Pipe, 14 Ga.
1346'—18" Steel Pipe, 12 Ga.
3200'—20" Steel Pipe, 16 Ga.

SCREENS
1—18" x 56" Traylor Vibrating Screen
1—3' x 4' Allis-Chalmers Aero-Vibe Screen
1—34" x 12' Symons Single Deck Screen
1—3' x 9' Simplicity 3 deck Screen
1—4' x 12' Tyler 2 deck Screen

BLOWERS AND FANS
2—Roots #1 Rotary Blowers
1—Sutorbilt #3M Rotary Blower
1—6" x 15" Victor-Acme Rotary Blower
1—7" x 17" Victor-Acme Rotary Blower
1—Sutorbilt #12-30 Rotary Blower
1—16" x 48" Connersville #5 Rotary Blower
1—Coppus-Vano Blower, Type SM Size 250
1—Coppus-Ventair Blower, Type TM Size 6
1—Coppus-Vano Blower, Type SM, Size 300
7—12000 CFM American Blowers, Type HS
1—7' Jeffrey Aerovane Mine Fan
1—42" Jeffrey Aerodyne Mine Fan #8H
1—10' Joy La-Del Mine Fan

FILTERS
2—4' x 2' Morse Drum Filters
1—3' x 4' Oliver Drum Filter
1—4' x 8' Eimco Drum Filter
1—6' x 8' Morse Drum Filter
1—4'—2 disc Denver Leaf Filter
1—6'—2 disc American Leaf Filter
1—8'—2 disc Oliver Leaf Filter
1—8'—5 disc Morse Leaf Filter
1—18" Morse Filter Press
1—36" Sweetland #12 Filter Press

COMPRESSORS
1—42 CFM Ingersoll-Rand NE-1
1—44 CFM Ingersoll-Rand ER-1
1—50 CFM Quincy VC-2
2—88 CFM Ingersoll-Rand ER-1
1—120 CFM Ingersoll-Rand ER-1, 8" x 6"
1—161 CFM Chicago-Pneumatic PB-2
1—179 CFM Ingersoll-Rand NE-1
1—198 CFM Sullivan WL-60
1—293 CFM Ingersoll-Rand Type 10
1—364 CFM Sullivan WG-9
1—445 CFM Worthington M-80
1—447 CFM Ingersoll-Rand Type 10
1—637 CFM Sullivan WJ3
1—698 CFM Union Low Pressure
1—800 CFM Ingersoll-Rand Type 10
3—105 CFM Ingersoll-Rand Portable, Gas Engine Driven, Rubber Tire Mounted
1—105 CFM Schramm Portable, Gas Engine Driven, Rubber Tire Mounted
1—105 CFM Ingersoll-Rand, Portable, Gas Engine Driven
1—310 CFM Sullivan Portable, Gas Engine Driven

MOTOR GENERATOR SETS
1—7KW General Electric 125 Volt DC Generator 440 Volt AC Motor
1—10 KW Hertner, Battery Charging Unit
1—11½ KW Westinghouse, 125 Volt DC Generator 440 Volt AC Motor
1—15 KW General Electric Battery Charging Unit
2—30 KW Joy Balancer Type DC Battery Chargers
1—40 KW Imperial, 250 Volt DC Generator, 440 Volt AC Motor
1—50 KW Hertner Battery Charging Unit
1—75 KW Ridgeway 125 Volt DC Generator, 2300 Volt AC Motor

BALL MILLS
1—4' x 4' Marcy Ball Mill
1—4' x 4' Denver Ball Mill
1—6' x 48" Hardinge Conical Ball Mill
1—8' x 22" Hardinge Conical Pebble Mill
1—9' x 8' Marcy Rod Mill

TUGGER AND SLUSHER HOISTS
3—Ingersoll-Rand Model D6U Air Tuggers
1—Ingersoll-Rand Model EU Air Tugger
1—Sullivan Model L-111 Air Tugger
2—Joy Model F-113 Air Tuggers
5—Gardner-Denver Model HK Air Tuggers
1—Gardner-Denver Model HM Air Tugger
2—5 HP Sullivan Electric Tuggers
1—5 HP Sullivan Electric 2 drum Slusher
2—15 HP Joy Electric 2 drum Slushers
1—10 HP Sullivan Electric 3 drum Slusher
1—10 HP Sullivan 2 drum Slusher, Gas Engine Driven
1—50 HP Sullivan 2 drum Slusher, Model CF-211

SEND FOR RECONDITIONED CATALOG NO. 561-M

MORSE BROS. MACHINERY COMPANY

2900 Brighton Blvd. KEystone 4-5261 Denver 1, Colorado

FOR SALE

COMPLETE 125 TPD FLOTATION MILL IN GOOD OPERATING CONDITION. Consisting of: jaw crusher, cone crusher, log washer, conveyors, vibrating screen, bucket elevator, ore bins, 5' x 6' ball mill, classifier, flotation cells, conditioner, thickeners, filters, pumps, motors, drives, starting switches, generators, steel building. Also A-C HD5G front end loader and miscellaneous other equipment. For further information call, wire or write: MONARCH MINERALS COMPANY, 2000 Republic Bank Building, Dallas, Texas.

SCRAP TUNGSTEN CARBIDE ROCK BIT INSERTS

are regularly purchased by Macro Tungsten Refinery. For our quotation F.O.B. shipping point, write P.O. Drawer 440, Port Coquitlam, B.C., Canada.

MOLYBDENITE

PROPERTIES WANTED

Please submit as complete details as possible on size, location, assays, reports, and other information available. We would like to have samples submitted.

MOLYBDENUM CORPORATION OF AMERICA
Nipton, California

BUSINESS MEN'S CLEARING HOUSE

601 MIDLAND SAVINGS BUILDING
DENVER, COLORADO

52 years of world-wide placement service for all classes of executive, engineering, operating, etc., mine and mill men

FILE YOUR APPLICATION WITH US

FEDERAL PIPE & TANK CO.

—WOOD PIPE and WOOD TANKS—

Factory and Main Office
6851 E. Marginal Way
Seattle 8, Wash.

GOOD USED EQUIPMENT FOR SALE

BALL MILLS FILTERS
ROTARY DRYERS CRUSHERS

SEND US YOUR INQUIRIES

PERRY EQUIPMENT CORP.
1429 N. 6th St. Phila. 22, Pa.
STevenson 4-7210

Market Place Advertising

360 inches	.....	$6.50
180 inches	.....	$7.00
90 inches	.....	$7.50
45 inches	.....	$8.00
Less than 45 inches	.....	$8.50

Contract rates based on local number of column inches used within one year.
30 column inches equal one page.
Closing date: 1st of month preceding publication.
(Used and reconditioned equipment, liquidations, property sales only)
For additional 10,000 WORLD MINING export distribution: Add 50%

CLASSIFIED SECTION

8 pt. type 15c per word. 10 pt. type 20c per word. Minimum charge $5.00.

(For Box numbers addressed to Mining World, add $1.00)

Boxed ads (display) in either Market Place or Classified Sections—$8.50 per column inch.

(See Market Place Section for lower contract rates).

Closing Date: If proof required, 1st of preceding month, otherwise 10th.

INDEX OF ADVERTISERS IN MINING WORLD

** Asterisk indicates firms whose products are catalogued in Mining World's 1956 Catalog, Survey & Directory Number.*

WANTED: Experienced diamond drill designer. Apply Chicago Pneumatic Tool Company, Utica, New York.

ENGINEER: Executive; age 39, graduate mining engineer, practical geologist, 21 years experience, exploration, development, operation, and construction in mineral production and beneficiation fields. Now employed, seeking new connection at management level with operating or development organization. Reply Box B-1, Mining World, 121 Second Street, San Francisco 5, California.

ASSAYER-ENGINEER for isolated field station of Territorial Department of Mines at Nome, Alaska. Must be qualified to do fire and chemical analyses for common ores and make field examinations of mineral prospects. Limited quarters provided at Nome station. Single status preferable due to travel. Position open April, 1957. Salary up to $7,000 per annum depending on qualifications. Contact Territorial Department of Mines, P.O. Box 1391, Juneau, Alaska.

GRADUATE MINING ENGINEER wanted by mining company operating in Mexico for position as Pit Foreman or Superintendent in relatively small open pit operation. Knowledge of Spanish desirable. Salary commensurate with qualifications and experience. Reply with full details Box C-2, Mining World, 121 Second Street, San Francisco 5, California.

POSITION OPEN: Tax Accountant as assistant to manager of Tax Department of a growing independent oil and mining company on west coast. Prefer age 35 to 40 with considerable tax experience. Offers opportunity in tax department and other corporate obligations. Submit details of personal status, education, experience and idea of starting salary. All replies treated confidential. Reply Box C-1, Mining World, 121 Second Street, San Francisco 5, California.

INCORPORATE YOUR BUSINESS IN NEVADA

Do business anywhere. Non-liability of organizers and promoters. Charter issued quickly at low cost for any business except banking and public utilities. Over twenty five years of incorporation and finance experience. Details upon request. L. O. Goodman, Box 991, Globe, Arizona.

MINING PROPERTIES WANTED: Please submit complete details on acreage, location, development done, assays, engineer's report if available, and terms of purchase. Reply Box P-4, Mining World, 121 Second Street, San Francisco 5, California.

GEOLOGIST REQUIRED by well-established company to conduct an exploration program in West Africa. Headquarters will be in capital city. Salary commensurate with qualifications. Submit summary of education and experience to Box C-3, Mining World, 121 Second Street, San Francisco 5, California.

3 COPPER MINES 81 patented claims. 100,000 tons shipping blocked, million tons milling, pit and underground. Development cost $1,000,000. Power, gas, water. Ore royalty buys. Owner 4261 E. 1st, Los Angeles, California. An 25109.

Mine Hoist: 150 hp Vulcan 1-drum with 150 hp GE Ty. MT 2200-v motor.
Rod Mill: 3x8 Marcy, with rod charge.
Jaw Crusher: 26x42 Farrell-Bacon.
Muckers: Elmco 12-B—18" ga.

Paul F. Smith
39 W. Adams St. Phoenix, Arizona

"The Origin and Nature of Ore Deposits"
By The Walker Associates
Box 1068, Colorado Springs, Colorado
Price: $6.50 postpaid in the United States
$6.75 postpaid in Canada and Mexico
$7.00 postpaid in other countries
Mailed on approval.

FOR SALE: Small double-drum portable pneumatic tired mine hoist with "A" frame, slusher and snatch blocks. Photo. $600.00 cash. Thayer Harp, Box 11, Daggett, California. Phone 6461.

Longyear

For a better drilling operation

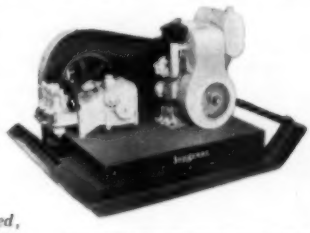
How to select a pumping unit for diamond core drilling

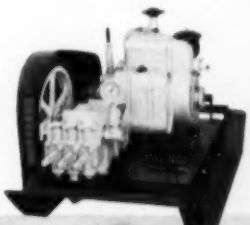
In diamond core drilling the careful selection of the proper pumping unit is of prime importance. Too often the pump selection is an afterthought, resulting in a costly, less efficient drilling operation.

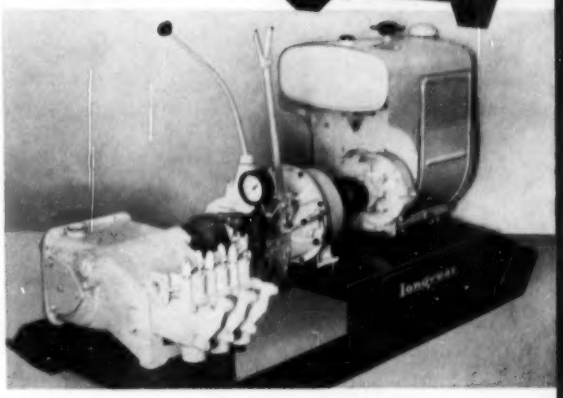
The pump must deliver the proper volume of clear water, at the correct pressure through the drill rods to the bit and back to the surface if the bit is to be kept cool and the cuttings carried away. An insufficient volume of water or inadequate pressure may create a dangerous situation. Cuttings, not properly removed, could trap the tools in the hole. Inadequate cooling might result in the "burning" of the bit.

Drilling Conditions—When selecting your pumping units, careful thought should be given to:

1. Conditions of water supply including:
   a. source of water
   b. distance from water source to drill site
   c. difference in elevation from water source to drill site
2. Conditions under which the drill will be operating, the formations to be penetrated, hole diameter and core size, depth of hole, drill rod size, uniformity of hole diameter, other factors.







SINGLE SPEED PUMPS

The Longyear 307 pumping unit (*Simplex, Ceramic Lined, 300 P.S.I.—7 GPM*) is good for shallow hole coring operations in the smaller sizes. The 307 is an excellent supply pump for remote operation because of its light weight. Under the majority of conditions this unit does not provide sufficient volume to carry out extensive fishtail or drag bit operations.

The Longyear 314 pumping unit (*Duplex, Ceramic Lined, 300 P.S.I.—14 GPM*) is most effective in medium sized coring operations employing considerable rock bitting, and very effective for employing small sized fishtailing operations.

The Longyear 320 pumping unit (*Triplex, Ceramic Lined, 300 P.S.I.—20 GPM*) is good for large sized coring or shallow fishtailing operations. Excellent supply pump for standard water supply conditions.

The Longyear 520 pumping unit (*Triplex, Ceramic Lined, 500 P.S.I.—20 GPM*) is very good for deeper coring jobs, large size fishtailing operations, or where heavier particles are present and where higher velocity is required to flush cuttings. This unit is an excellent supply pump where maximum gallonage required is 20 GPM.

The Longyear 535 pumping unit (*Triplex, Ceramic Lined, 500 P.S.I.—35 GPM*) is designed for operations where greater volumes and higher pressures are required.

TRANSMISSION PUMPS

Pumps with transmissions are demanded by experienced drillers. These units provide the versatility necessary for rock bitting and fishtailing operations, for coring operations to moderate depths, for deep hole coring operations—all conditions satisfied by one pumping unit. These units can be used as supply pumps as well, but size and weight may not fit requirements, in all cases, as would single speed Longyear 320, 520, and 535 units.

The Longyear 520-Q pumping unit (*Triplex, Ceramic Lined*) is the most efficient, all-around pump in that the "three speed transmission" makes possible a number of combinations of volumes and pressures—from 7.9 to 20 GPM's at 500 P.S.I.—Gasoline Powered (also available with Diesel and Electric Power).

The Longyear 535-Q pumping unit (*Triplex, Ceramic Lined*) like the 520-Q permits a number of combinations, but greater volume range is possible with the five speed transmission—from 4.5 to 35 GPM's at 500 P.S.I.—Gasoline Powered (also available with Diesel or Electric Power).

CONCLUSION: Write E. J. Longyear Company, Minneapolis, Minnesota, for illustrated specification sheets on any of the above units.

Diamond Core Drill Manufacturers
Core Drilling Contractors • Mining Engineering and Geological Consultants

E. J. LONGYEAR CO. CABLE LONGCO
General Offices: Foshay Tower
Minneapolis 2, Minnesota

CANADIAN LONGYEAR LTD., NORTH BAY, ONTARIO • LONGYEAR ET CIE., PARIS, FRANCE

WILFLEY
SAND PUMPS

INCREASED OUTPUT 1½ TPH!

The team of a Wilfley Sand Pump and a cyclone classifier increased this sand plant's production by 1½ tons per hour! In addition, the American Society of Testing Materials' spec. was raised approximately 50%. Because of the recovery of fines which were being washed away, and the dependable, trouble-free operation of the Wilfley Sand Pump, this producer—using the same quantity of raw materials—was able to upgrade the quality of products and increase profits.

This is one of the many examples of how Wilfley low cost pumping can help you. Write or wire for complete details.

WILFLEY ACID PUMPS
"COMPANIONS IN ECONOMICAL OPERATION"
WILFLEY SAND PUMPS

Individual Engineering on Every Application

A. R. WILFLEY and SONS, INC.

Denver, Colorado, U.S.A. • New York Office: 1775 Broadway, New York City